FIRST LOOK: HOT, NEW AMD 266-MHZ K6 PCs CHALLENGE 266-MHZ PENTIUM IIs

LATEST TOP 10 PRINTERS, GRAPHICS BOARDS, AND MORE

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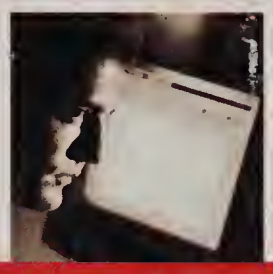
NOVEMBER 1997

Top 56k Modems

Speedy, Cheap, but Risky: We Rate 13 Models From $119



Surf the Web, Get Fired

Is Your Company Monitoring Where You Go?

The Internet Comes to TV

Grab the Remote! Plus, Are the New Web TVs Worth It?

THE RIGHT CHOICE

NEW PC or UPGRADE?

BEST BUY PCs From $1799 and Up

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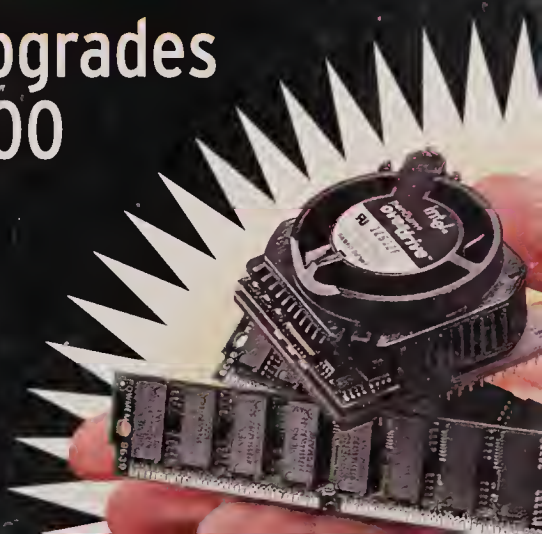
COMPLETE GUIDE to PC Upgrades

Can't-Miss Upgrades as Low as $300



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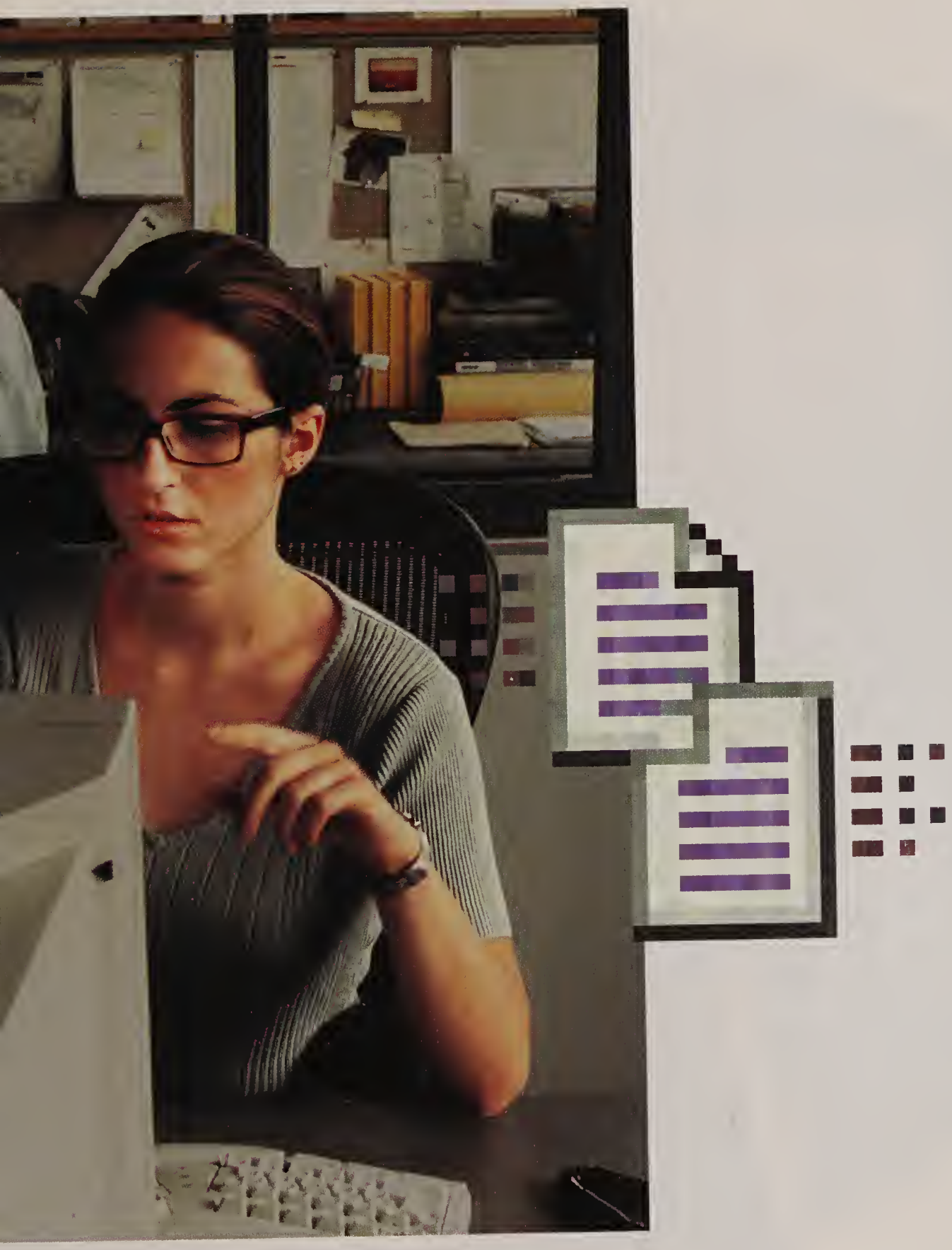

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To: Webmeisters
Re: Check out this site.

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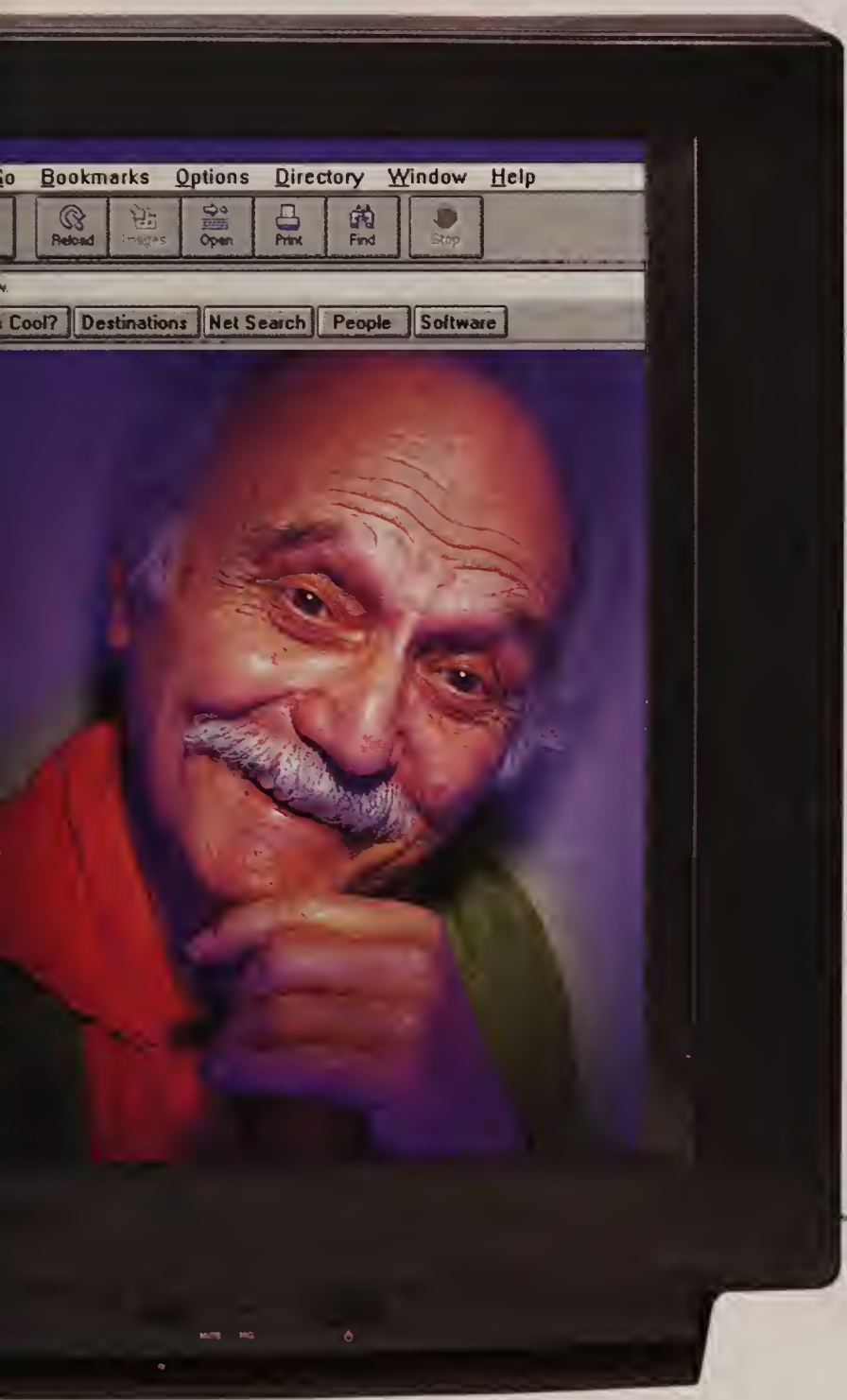

the monitor

Early computer "displays" were simple text displays or printed output. Used with mainframes, the first true monitors were rack-mounted behemoths. In the early 1980's microcomputers displayed alphanumerics and jagged graphics in monochrome. Today, monitor technology has advanced to exquisite high-resolution color and full-motion video.

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PC WORLD

NOVEMBER

VOLUME 15 ◆ NUMBER 11

COVER STORY

THE RIGHT CHOICE: NEW PC OR UPGRADE?
You can replace your old PC with a Best Buy Pentium MMX-200 or PII-266 for as little as $1799 or as much as $3099. But if a new Top 20 PC is beyond your budget, our annual upgrade story uncovers some gems that deliver performance gains for just a few hundred dollars. Here's all you need to decide whether to trade up or upgrade.

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266 **BEST BUY PCS: THE QUICK AND THE CHEAP**

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142 **CAN'T-MISS UPGRADES**
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166 **CHANGING CHANNELS: WILL THE INTERNET BECOME TV?**
TRENDS Everyone from Microsoft to the cable industry is betting you'll tune in to the Net on TV. Will TV Web surfing be the next great American pastime? We plug in with set-top boxes about to hit malls.

191 **ROUTE 56K: FAST MODEMS, BUT WATCH FOR SPEED BUMPS**
REVIEW Is all this hassle with 56-kbps modems worthwhile? You won't get twice the speed of your old 28.8, you can't send files faster than with a 33.6 unit, and your ISP may not support your modem. But they're still the best low-cost way to get faster Web access.

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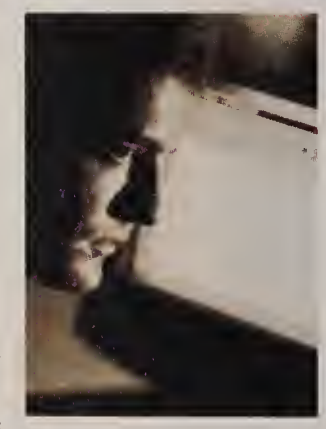

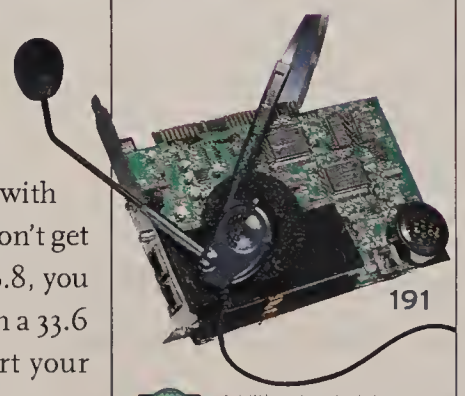

online Additional material available on PC World Online: www.pcworld.com

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REVIEW Your software keeps adding new features, but lousy manuals and impenetrable online help have kept you from learning to use any of them. We review training products—books, videotapes, and CD-ROMs—and find some pretty bad teaching tools, as well as some pretty good productivity boosters.

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COVER *Photographs by Marc Simon*

ICONS: JEFFREY PELO

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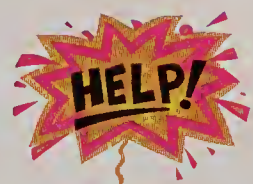

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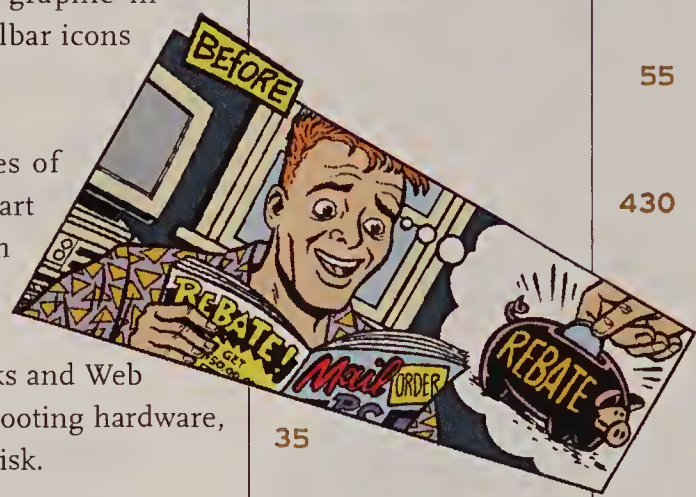

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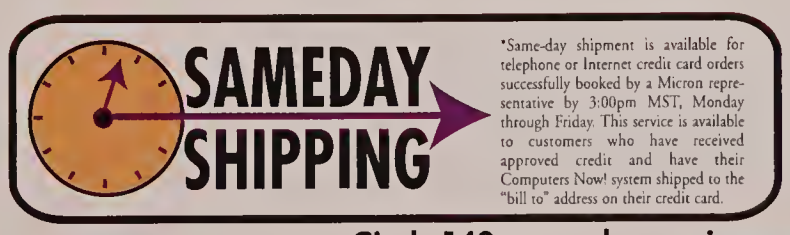

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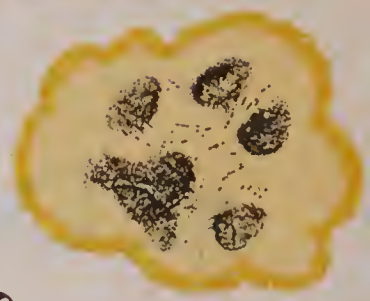
Christian Murphy was non-verbal. He lived with a wall between himself and the world.



1 THIS IS CHRISTIAN.

He can see, hear, feel, touch, but he cannot speak. He was born with autistic tendencies that cut him off from the world around him.

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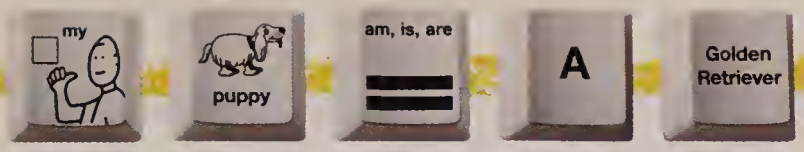

2 A TEACHER DISCOVERED *that Christian would respond to images from his life. She put visual cues to the story of his new puppy on a special keyboard.*

NEC MultiSync Monitors
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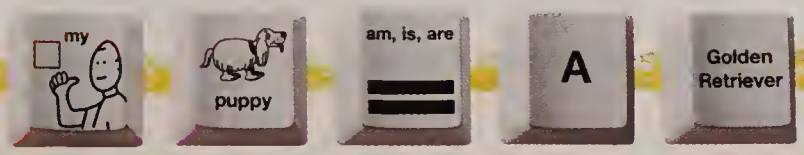

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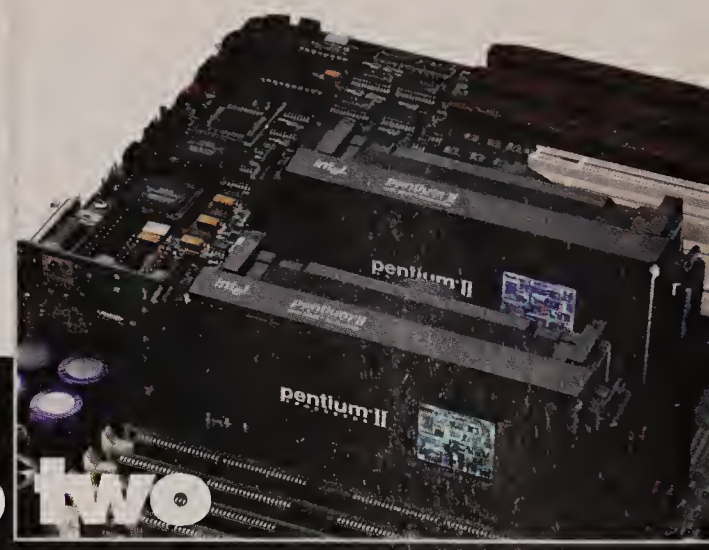

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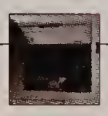

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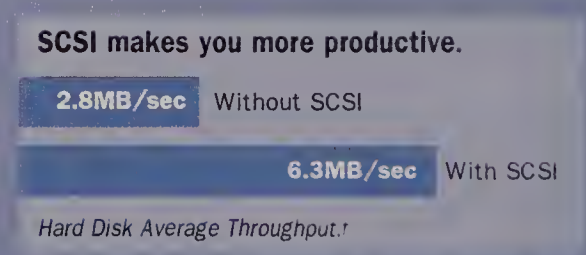

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The Right Choice: New PC or Upgrade?

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In the last ten months, chip makers and, in turn, PC vendors have introduced four classes of processors, each in several clock speeds. That's a total of 13 new processors for mainstream and high-end desktop PCs, not counting CPUs for notebooks and low-end desktops.

An exaggeration? Hardly. In January Intel introduced its Pentium MMX chips, now available in clock speeds of 166, 200, and 233 MHz. A few months later both Intel and Advanced Micro Devices released their next-generation processors: Intel with its Pentium II, initially at speeds of 233 and 266 MHz, and AMD with the K6, at speeds comparable to the Pentium IIs'. Cyrix followed suit with its 6x86MX in three clock speeds and priced to compete aggressively with Pentium IIs and K6s. In August Intel upped the ante with its 300-MHz Pentium II, which has a chip set for Accelerated Graphics Port support. And this month AMD volleys back with its latest competitor, the K6-266, aimed squarely at the 266- and 300-MHz Pentium II market. It's enough to send even the most technology-crazed buyer reeling.

Don't get caught up in the **game of specsmanship.** For most buyers, "the fastest PC yet" **isn't worth** the price.

HORNS OF THE DILEMMA

TYPICALLY, PC BUYERS react in three ways to such an outpouring of new technology. Those who absolutely must have the fastest PC slap down their credit cards without a second thought. More conservative buyers remain unimpressed, doubting (and rightly so) that they need a faster PC to run WordPerfect under Windows 3.1. A third and very large group succumbs to total paralysis. These PC owners agonize for months, trying to decide whether to buy a new system, and if so, when: Should they spend $2500 for a PC that may be obsolete in a year or even months? Should they wait for prices to fall, or is now the best time to buy? Should they wait for the next new chip? For MMX software? For AGP software?

If you fall into this third camp, don't expect it to get any easier next month or the month after. Instead, think about buying a PC like you think about buying a car. If your '94 Honda has 75,000 miles, gets you where you want to go, and simply needs a $300 tune-up, you'd be nuts to spend $20,000 to replace it. But if the car is pushing 120,000 miles and you're spending too much time and money on maintenance, then it makes eminent sense to trade it in.

If your PC needs only a tune-up, turn to this issue's cover story, "Can't-Miss Upgrades." Upgrading an older Pentium PC is a no-brainer these days, given the price of RAM and some of the new upgrade processors. Testing for our cover story shows that adding 16MB of RAM and a 166-MHz Intel Pentium MMX OverDrive can speed up a 100-MHz Pentium by 22 percent for just $300. Why spend $1400 to $1800 on a new Pentium MMX-166 PC to get the same increase in performance?

If you need to trade in your old PC or are agonizing over a decision, relax. Prices will inevitably fall in the coming year, but the value of many new PCs right now is incredibly attractive. Some examples: Last November the number one Top 20 power system was a Pentium-200 with 16MB of RAM and a 2.6GB hard drive; it achieved a PC WorldBench score of 208 and cost about $2900. This month's number one power system is a Pentium II-266 with 64MB of RAM and an 8.4GB hard drive. It racked up a PC WorldBench score of 264 and costs about $3100. That's a 27 percent increase in performance and a 7 percent increase in price. Similarly, the number one Top 20 budget PC a year ago was a Pentium-133, priced at $1900 with 16MB of RAM and a 2.1GB hard drive; its PC WorldBench score was 182. This month's number one budget PC is a Pentium MMX-200 costing about $1800 with 16MB of RAM and a 2.1GB hard drive; its PC WorldBench score is 219. That's a 20 percent increase in performance and a $100 drop in price.

BEWARE THE FASTEST PC YET

NO MATTER WHICH STRATEGY you take, one piece of advice applies: Don't get caught up in the industry's accelerating game of specsmanship. In almost all cases, the latest processor offers less than a 7 percent performance improvement over the next-fastest CPU—an increase you won't notice in day-to-day work. For most buyers, "the fastest PC yet" simply isn't worth the price.

Cathryn Baskin is editor in chief of PC World. ■

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YOUR TAKE ON: Windows 98 ◆ OS alternatives ◆ Internet security

WHAT A PAIN

YOUR EXCELLENT article "What a Pain! The First Six Months of Owning a PC" [September] reminded me of frustrations I've encountered over the past year. I am technically savvy and have a knack for troubleshooting, so with all the messes I get into, I often wonder how people without a technical background handle computers. It's all I can do to get them running.

Scott McMahan, Asheville, North Carolina

YOUR ARTICLE ON the pitfalls of PC ownership seemed to criticize Aegis's warranty for not covering "problems that occur as the result of adding hardware and software, unless the offending program is removed first." What is expected, then? Should every computer manufacturer set up labs large enough to test their systems with all available hardware and software, as well as all possible combinations? And still offer free support? And still keep the price of a system under six figures?

If I purchase a piece of hardware or software that is not compatible with my system, I call the manufacturer of the add-on. The incompatibility is no more an issue for my PC's technical support department than my purchase of a desk that's too big for my office is my realtor's problem.

Paul Berry, Newport News, Virginia

WHO NEEDS WIN 98?

REGARDING "Windows 98: A Convenience You Can Live With...Or Without" [September]: While competing magazines have been falling all over themselves about the upcoming Windows upgrade—the hype rivals that surrounding Madonna's pregnancy—*PC World* dared to ask, Who needs it? Judging by all the press releases and feature articles (it's becoming more difficult to make the distinction), Windows 98 has few truly new features. Active Desktop? All I want on mine is the program currently in use, not all these icons screaming for attention.

Gerard Ramos, Quezon City, Philippines

WHO NEEDS IT? WE DO!

YOUR VIEW of Windows 98 is off the mark for many people. The poor Win 95 retail customer has been hung out to dry with the OEM releases. We can't take advantage of FAT32 and other new features. While I might agree that Win 98 should be a service release for retail customers, a version of Win 95 that consolidates its many updates and patches is way overdue.

Hal Nyce, Everett, Washington

THE NETWORK PC

I READ WITH interest the article "The NetPC Arrives: Back to the Future for User Control?" [September]. The thought of our IS department having remote control of my PC terrifies me. I work with both PCs and UNIX-based workstations, and the difference in support is like night and day. When something goes wrong on the UNIX network, it is fixed quickly and correctly, usually before I have time to complain. The PC support group can't install a CD-ROM drive properly and has been known to completely reformat a ▶

HOT BUTTON

Where Are the Software Volkswagens and Toyotas?

IN SEPTEMBER *Full Disclosure*, Stephen Manes says, "Microsoft is increasingly looking like General Motors did in the sixties. It cranks out big, gimcrack-laden road hogs ...and it gets people to buy them because there's no real alternative. Where are the Toyotas and Volkswagens of the software industry when we need them?"

I agree with Manes's analogy, and I think if he looks more closely at the situation, the answer becomes apparent:

Today's equivalents of Toyota and VW are IBM's OS/2, Linux, UNIX, the Mac OS, and so forth. But when do readers of computer magazines ever see these alternatives discussed in a positive way?

In the sixties, car magazines were busy touting the latest and biggest (bloated) item to emerge from Detroit. Someone would occasionally point out that VWs did just as good a job of moving bodies from point A to point B, with half the gas consumption (and they were easier to park).

ILLUSTRATION: PHILIP ANDERSON

But VWs were scoffed at by most of the press—"Too small." "Too ugly." "Un-American." "Not enough dealers and repair places around the country." (Sound like "No apps available"?)

So, Mr. Manes, the Toyotas and VWs are here. But the majority of home and small-office users haven't heard about them because their sources of information tend to write only about Windows.

Clyde Stauffer, Internet

IF PEOPLE from the Windows world took the time they spent dodging Windows' limitations and bugs and recovering from crashes, and invested it instead in installing and learning Linux or any one of the many free UNIXes, they would be more productive.

Ben Pfaff, DeWitt, Michigan

THERE REALLY ARE other operating systems out there. I've used OS/2 since version 2 but recently installed Windows NT 4.0 in order to take advantage of new software that requires it. I thought that over time I would become used to NT 4.0, slowly switch from OS/2, and join the rest of the Microsoft herd. But the more I try to switch, the more I become convinced of OS/2's superiority. I know OS/2 is really hard to install, and I know that IBM's meager (almost nonexistent) support is dismal to say the least, but I also know when I have a good thing.

Murray Penney, Internet

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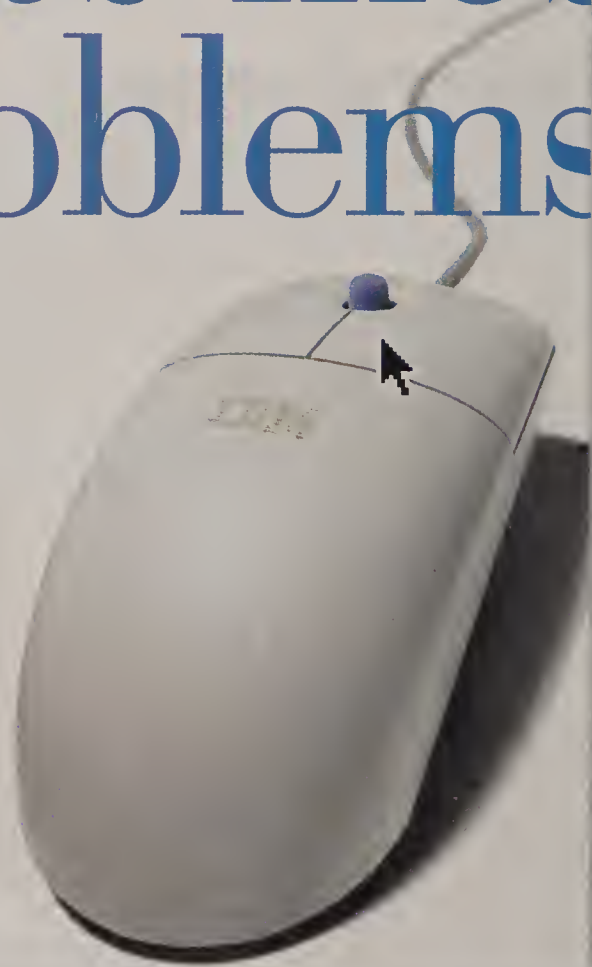

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hard drive—without warning—to make OS upgrades easier. I don't let those people near my PC until I've backed up the entire hard drive. Until Windows is improved, you can keep your NetPC!

David E. Carr, Tewksbury, Massachusetts

OFFICE 97: A WAYWARD CHILD?

IN SEPTEMBER *Real Solutions*, "Doing Battle With Microsoft Office 97," Christine Muehling details the problems she had installing this behemoth, then concludes: "In the end, I still love Microsoft Office, the way you do a wayward child..."

If Muehling had developed Office 97, I might see the analogy. But she obviously paid good money for this product, and when it failed to live up to reasonable expectations, she tossed it off as if this kind of performance should be expected, even tolerated. She is, sadly, the ideal (and probably typical) Microsoft customer, blithely accepting of whatever Microsoft dishes out regardless of quality. I wonder if she would be so accepting of a General Motors car that didn't start for the first week.

Anthony Cagle, Seattle

INTERNET SECURITY

AUGUST'S *Bugs and Fixes* discusses the latest Internet Explorer security problem with PowerPoint presentations—and describes everything a potential violator needs to produce a destructive Web page. Why did you do this? Couldn't you just say an IE patch fixes security issues that have surfaced? I fear your advertising the details will lead to more sites that take advantage of this opportunity for mischief.

Chad Atchley, Norman, Oklahoma

Editor's response: Whether I "advertise" it or not, people are going to take advantage of the browser security flaw. Microsoft has already described the flaw publicly in greater detail than I did. –Scott Spanbauer

SHOPPING ADVICE

YOUR MAGAZINE consistently advises users to buy the most technology they can afford. Although this is fine for those who need cutting-edge technology, such as graphic artists or laptop users who can't upgrade their systems, you should urge everybody else to get only what they need.

People should not pay a $600 premium just to have the latest technology for six months. Older equipment has more attractive prices. Systems that cost $2100 or more six months ago are now going for $1500 or less. It pays to wait.

Eric Nakano, San Dimas, California

Editor's response: Your point is well taken. However, you have to evaluate not only your needs today but what they might be a few years down the road. Considering how fast operating systems and applications change, that can be a tough call, and you can spend a fair amount of money upgrading your PC. So buying as much technology as you can is really the safer way to go. –Tracey Capen

BACK UP, BACK UP, BACK UP

C. K. CREASE'S letter in the August *PC World* mentioned deleting *all* .htm files to save disk space. I followed this suggestion and regained some space, but I also unknowingly deleted my bookmark.htm file and lost 200 bookmarks for the Internet. *Mad* doesn't begin to describe my feeling.

Then I remembered I had a recent tape backup, and after about 15 minutes, I was again using my old bookmarks.

Two morals: 1) Back up, back up, back up; and 2) don't delete files without knowing what you are doing.

Bob Blum, Woodstock, Georgia

WHERE ARE THE HIGH-END GRAPHICS BOARDS?

WHY DON'T YOU review the more expensive graphics boards? How can buyers make an intelligent choice if they don't know what they are (or aren't) getting for their money? I don't see price limitations on any other products you review.

William Sommerwerck, Bellevue, Washington ▶

CORRECTIONS & CLARIFICATIONS

IN OCTOBER'S "Everything You Need to Run Your Business," the price for a year's support for BestWare's MYOB Premier should have been $249.95, not $2495. This mistake, due to a typographical error, didn't affect our overall assessment of MYOB Premier. It was a close runner-up to our Best Buy among multiuser accounting packages.

PC World regrets the error.

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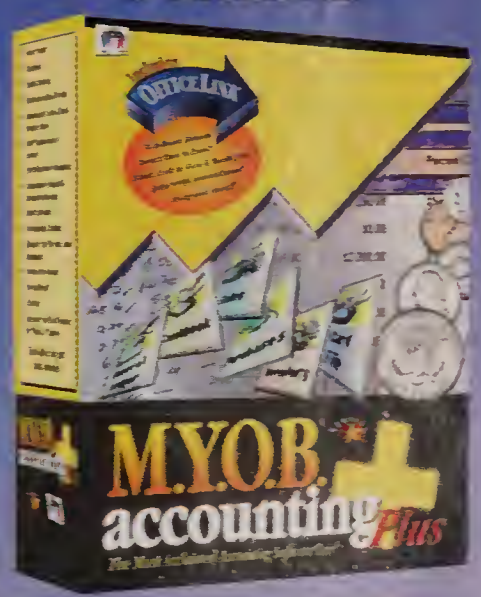

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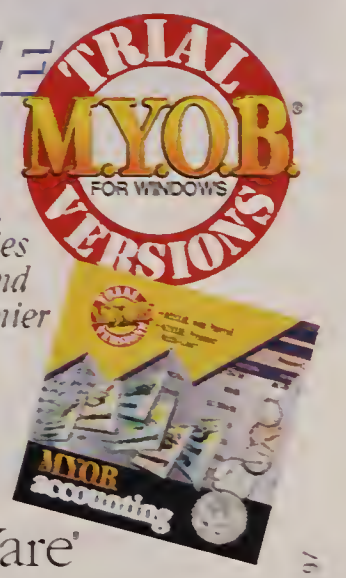

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COMING UP

IN DECEMBER

HIGH-TECH GIFTS

Holiday shopping for the hard to please? Pick from these high-tech toys and tools, including a PDA the size of a business card, a cell phone packed with pocket-PC features, a digital camera that looks like it came out of James Bond's pocket, and much more.

PERSONAL PRINTERS: COLOR AND BLACK AND WHITE

Color is tops—but monochrome printers still provide workhorse efficiency for many users. We review the latest personal printers, both monochrome and color, and rank our Top 10.

NEW AGP GRAPHICS BOARDS

Intel's Accelerated Graphics Port promises better 3D and faster graphics on Pentium IIs. But PCs without AGP can't be upgraded. Should this new interface be part of your buying plans? We test the first AGP cards against PCI cards.

SMALL OFFICE, HOME OFFICE: YOUR NET ON A BUDGET

Scared of having to pull wires through walls or buy $10,000 servers? Networking your small office does not have to be an expensive or complex project. Here's how to network on a budget, effectively and efficiently.

ALSO NEXT MONTH

▶**The PC World Top 100:** The top power desktops, budget desktops, home PCs, notebooks, printers, monitors, graphics boards, and modems.

▶ **Here's How:** *Upgrade Guide* on installing an EIDE hard drive, *Windows Tips* on maximizing use of your mouse and keyboard, *Hardware Tips* on keeping your PC free of dust, smoke, and grease.

PC WORLD

Editor's response: We don't review these products because they are no faster at running the programs our readers use—word processors, spreadsheets, databases, e-mail, and Net browsers. They *are* fast in specialized 3D and very high-end photo-editing and desktop publishing programs. But our research tells us that the majority of our readers do not use these programs and so don't need to spend the extra money that these boards cost. –Brad Grimes

LOVE LETTER

YOU MIGHT like to know I owe my new career in large part to *PC World;* I am totally self-taught—from studying your magazine for the past three years.

I went from being a fashion industry executive to a nerd. Your monthly tips and tricks helped me hone my PC skills to the point where I'm about to make the biggest career switch in my life: I was just offered an incredible job in the interactive marketing department of a l-a-r-g-e technology company.

I'm continuing my "graduate" studies with you—my subscription will probably expire only when I do.

Renee Palmer, East Hampton, New York

WHERE'S THAT LINK?

SEPTEMBER'S *Answer Line* mentions a file that allows multiple modems to be used on a machine simultaneously. The link given in the magazine and the one offered on PC World Online's Web page are both incorrect. The correct address is www.microsoft.com/windows/download/msisdn11.exe.

Mike Rodriguez, New Orleans

Editor's response: Unfortunately, the changing nature of Web addresses, combined with publishing lead times, means URLs printed in the magazine are sometimes out of date. However, PC World Online features up-to-date versions of most files listed in the printed version (www.pcworld.com/files). In this case, you can locate the file at www.pcworld.com/cgi-bin/database/file_body.pl?ID=2521. –Scott Spanbauer

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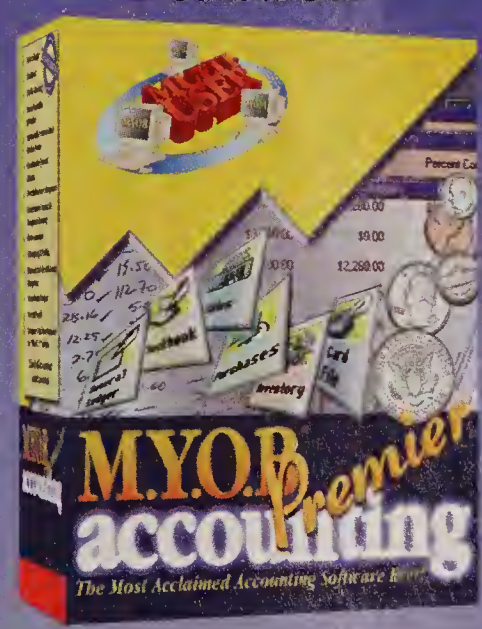

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The Trouble With Rebates

Everybody likes to save a buck. But sometimes saving money can be expensive.

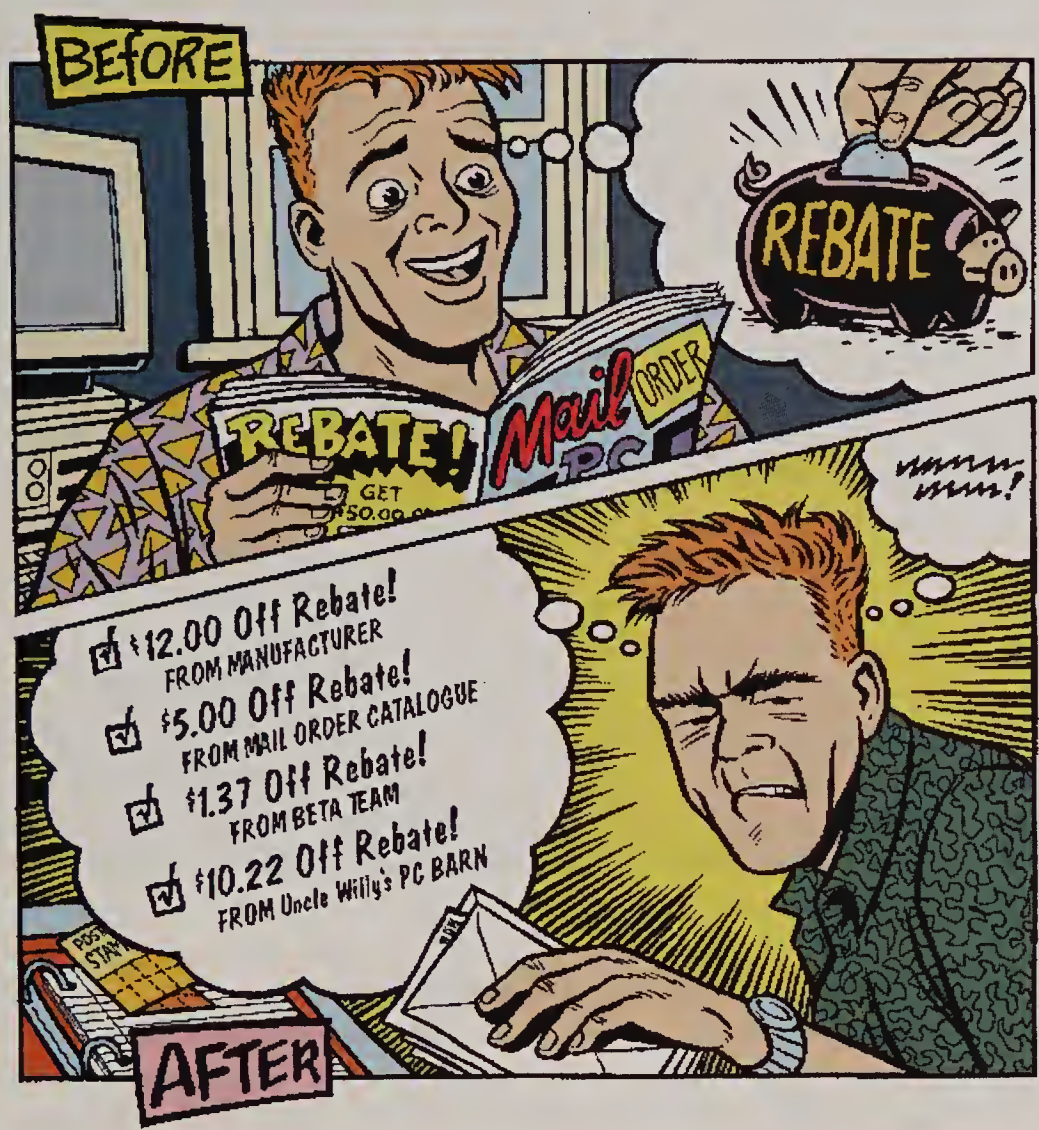

ILLUSTRATION: MARK ZINGARELLI

MONEY TALKS—JUST ASK DANIEL ERNST. When the Farmington Hills, Michigan, accountant needed a removable mass storage device last year, he easily narrowed his search down to either the $199 Iomega Zip drive or SyQuest's $199 EZFlyer 230. Iomega's $50 rebate offer persuaded him to go with the Zip drive.

The rebate was equivalent to one-quarter of the Zip drive's selling price, so Ernst bought the unit, filled out the rebate form, clipped the UPC code from the box, attached his receipt, and dropped his envelope in the mail to Iomega. And then he waited. And waited.

When six weeks had passed without a word (or a check) from Iomega, Ernst called the company and was told there was a backlog on rebate checks because of the "overwhelming" response to the promotion. The representative apologized, and told Ernst he could expect his rebate check shortly. And so Ernst waited. Again he called Iomega, and was told to resubmit his documentation. After seven months, two phone calls, and one e-mail message to our own *PCW Advocate*, Ernst finally got his rebate.

Troubles with rebates are nothing new. Over the last year, *PC World* has received numerous complaints about rebate promotions offered by Microsoft, NEC, Philips, and U.S. Robotics, and dozens of complaints from consumers about delays and other snafus relating to Iomega's rebate program. Although the specific products and offers vary considerably, the complaints are remarkably consistent: misleading promotions, lengthy delays in processing checks, and paperwork mix-ups.

REBATE REPROBATES

FRAUD IS RARELY the issue with tardy rebates. Most of the problems can be chalked up to poor planning, says Seymour Merrin, president of Merrin Information Services, a Palo Alto, California, market research firm that tracks trends in the retail marketplace. Rebate programs backfire, says Merrin, because companies are unwilling to invest enough money in processing the submissions. "Many companies in our industry are so inexpert or arrogant that they try to do the fulfillment themselves, or they use the cheapest redemption house available," he says. "It's like saying, 'Oh, the Indy 500 looks like a fun race; I think I'll enter it. After all, I've been driving for 15 years.'"

It's clear from my interviews with consumers that poorly managed promotions have soured many on rebate offers. George Siegel, a computer consultant in Southern California, is just one of many consumers I spoke with who steer clear of most rebate promotions.

"I personally view most of the present rebate offers as somewhere between sleazy marketing practices and outright larceny," declares Siegel. He cites as an example a recent promotion at a local computer store in which 8MB SIMMs were advertised for just $29.95. When Siegel inquired further, he found that the price included two $10 rebates—one from the manufacturer, one from the store—but only if con- ▶

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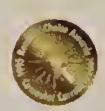

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Circle 212 on reader service card

sumers bought *two* 8MB SIMMs. The actual price was $49.95, which was much more than 8MB SIMMs cost elsewhere.

Siegel cites another example in which a software company priced an upgrade at $170, then offered consumers a $100 rebate for upgrading. His question: Why not just charge $70 for the upgrade and spare consumers the hassle of having to fill out the forms, pay sales tax on a much larger purchase, and wait months for a rebate?

The answer is simple: Most hardware and software companies are hoping that although rebates will entice consumers to buy their products, most people will never actually get around to dealing with all the rigmarole required to redeem them.

"Based on normal marketing standards, there's a percentage of people who will [respond to a rebate offer] and those who won't," says Iomega spokesperson Cory Maloy. "Our actual response rate was greater than we anticipated," leading to a severe backlog in the processing of requests. Although Iomega won't disclose the actual percentage of buyers who responded to the rebate offer, other industry executives indicate that a response from more than 5 percent of the purchasers is considered high.

Richard Alexander, a consumer law attorney in San Jose, California, says his office has received a number of complaints from consumers who feel they've been ripped off by rebate offers. "I suspect that companies hope consumers will eventually forget about [the offer] and go away," says Alexander.

But there's another reason companies offer rebates instead of lower shelf prices: Every time a consumer does send in a rebate form, the company gains valuable information about its customers—information it can use in future promotions.

CONSUMERS FIGHT BACK

ALTHOUGH NO FEDERAL regulations specifically govern rebates, at some point repeated delays become a "material misrepresentation," says Allen Hile, assistant director in the Federal Trade Commission's division of marketing practices.

And what's considered timely? If a company promises to process rebates within 30 days, then "we can probably all agree that six months is probably too damn long," Hile says.

Alexander and other consumer advocates advise buyers to pursue until they get their money, rather than write off the errant rebate. The FTC's Hile says consumers should "complain to everyone they can think of" when they have trouble obtaining a valid rebate. "Write to the manufacturer, the store, the state attorney general's office, the Better Business Bureau," says Hile. "At some point it gets easier to process the rebates than to deal with all the complaints."

And when you're sending off those letters, don't forget to add *PC World* to your list of recipients. We plan to follow the subject closely in coming months.

You can have your say on any consumer issue. Send e-mail to consumerwatch@pcworld.com. Roberta Furger is a contributing editor for PC World. *Her first book,* Does Jane Compute? *is to be published by Warner Books in February 1998.* ■

REBATE SMARTS

BEFORE YOU GET swept away by a flashy rebate promotion, consider these points:

- Is the product really worth buying? You won't save a dime if you buy a product you don't need.
- Will you cash in on the offer? Consider your track record. If you never seem to find the time to fill out the forms, don't assume that this time will be different.
- Is the offer still valid? Retail shelves are full of products that tout impressive rebates, many of which have long since expired. Read the fine print—even if it means pulling the sticker off the package—to check.
- Do you need to keep your receipt? To reduce fraud, many companies require that consumers send in their original receipt to obtain a rebate. If you'll also need that receipt for business or tax purposes, you may want to think twice about the offer.
- Have you made a copy of the form? Don't send in a rebate offer without first copying the completed documentation.

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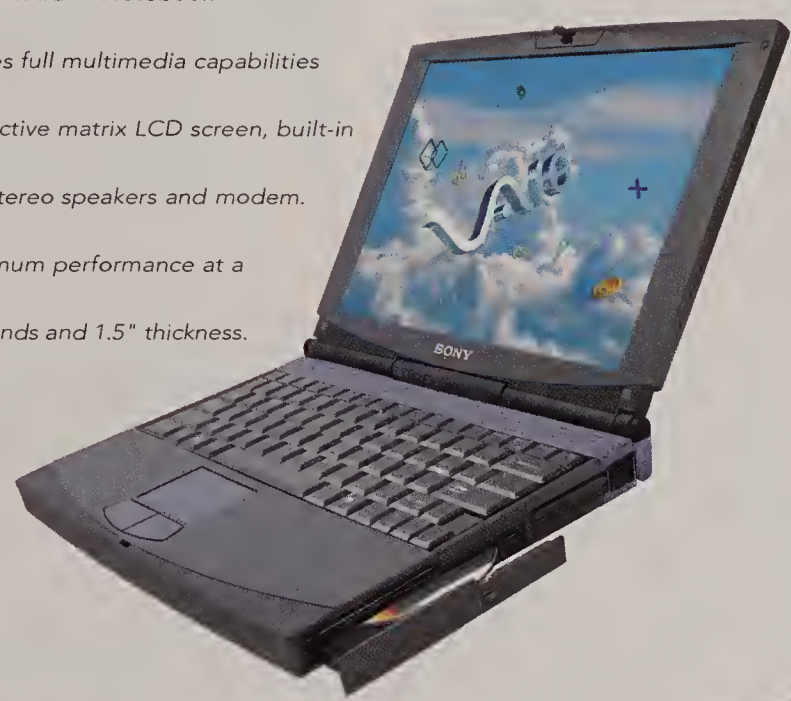

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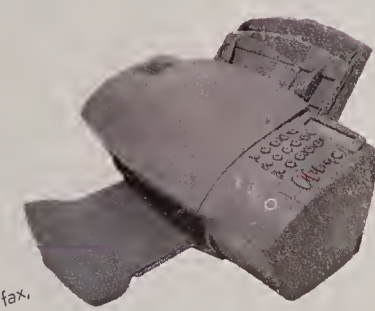

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SONY

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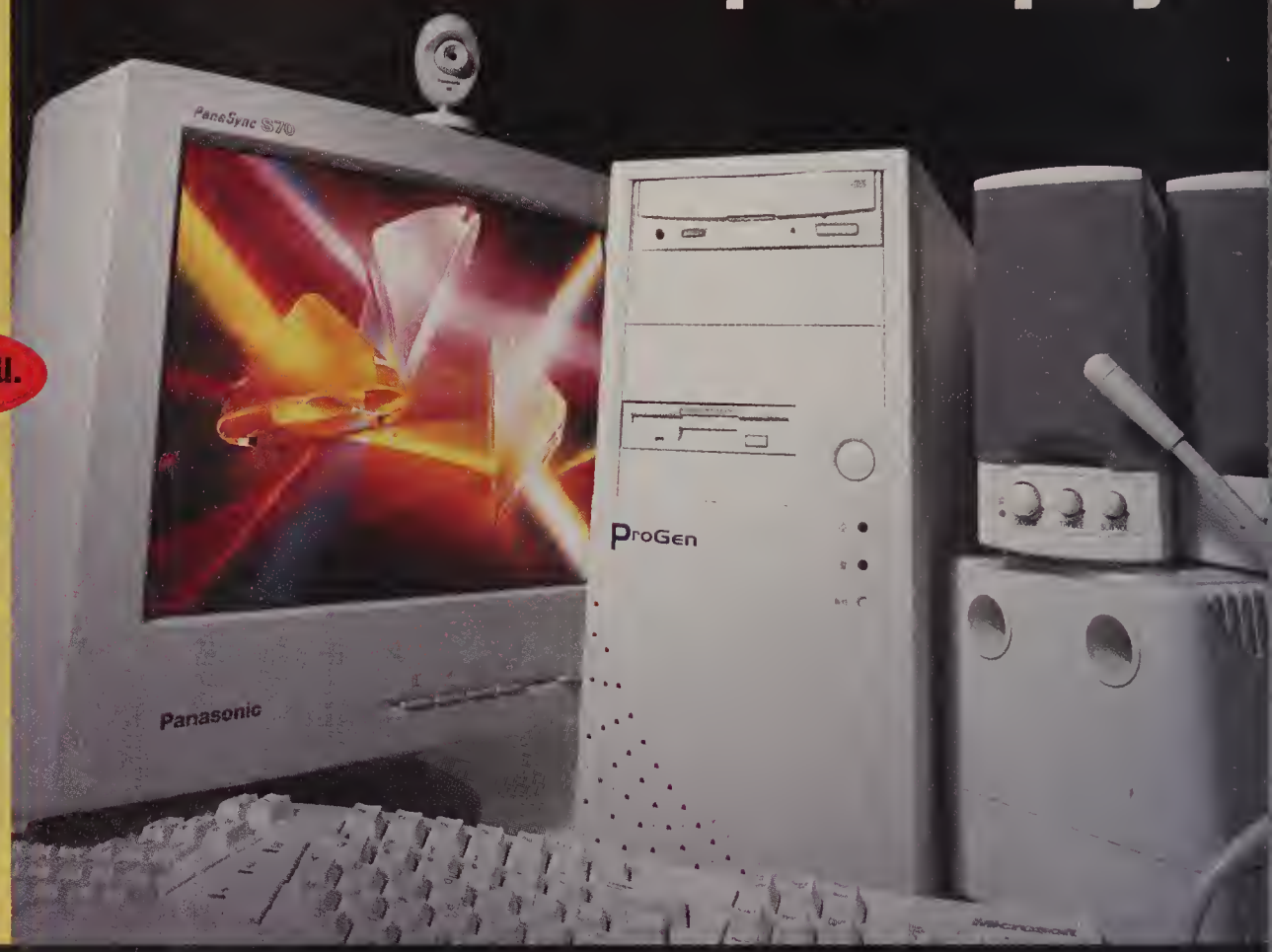

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Circle 184 on reader service card

AOL members speak out ◆ Skimpy software documentation ◆ Speedy Canon

AOL Members Up in Arms

ANGRY. THAT'S ONE WAY to describe the growing group of America Online members who have joined forces to formally protest the $1.99 per hour they must pay to play on the Games Channel. Lee Hopson of Honolulu wrote, "So much for 'unlimited access.' AOL has forgotten its roots: *us*."

According to Wendy Goldberg, AOL spokesperson, "We've said that we would add premium services, and the Games Channel gives added value." At least 1460 AOL member addresses were circulating on the one petition for action. At press time the group still had not gotten a response from AOL.

ILLUSTRATION: HUNGRY DOG STUDIO

ONLINE HELP? NOT FOR ME

SANDRA PETERSON OF Des Plaines, Illinois, wrote to tell us she was shocked to find no written documentation for Microsoft Office 97, which came bundled on her new Dell Dimension XPS 200m. "We're supposed to use the on-screen help guides, but I want a decent manual." With most mail-order firms, chances are you'll get little more than start-up guides with bundled software. So if you want a hefty manual, you'll have to buy it. The Microsoft Office 97 for Windows Resource Kit can cost $120 retail.

PAY FOR SUPPORT?

ERNIE SANTILLI OF Drexel Hill, Pennsylvania, purchased a Packard Bell Force 482CDT in October 1995 from his local Computer City store. Fifteen months later, he started to get fatal error messages and called tech support. "After an annoying hold time of more than 30 minutes, the techie told me I'd have to pay $30, and that wasn't mentioned in the documentation."

Mike Voges, customer satisfaction specialist at Packard Bell NEC, confirmed that early in 1997 a $29.95 fee was introduced for out-of-warranty support calls. "Fee-based support means that customers are far more motivated to read the manual first," says Voges. Many companies don't charge for out-of-warranty hardware support but instead offer lifetime support. Packard Bell's fees, though, compare favorably to those of companies that do charge.

LIFE OF REPLACEMENT PARTS

ANNETTE NALEVANKO OF Baltimore wondered where she stood with her HP Pavilion's one-year warranty. She had replaced several components after she bought the system. Are those parts warranted from the time she bought the computer or from the time they were installed?

According to Dona Munsch, Hewlett-Packard's North American support business unit manager, "If your motherboard fries on day 364, for example, you're entitled to 90-day coverage from the day the component is replaced." Check with your PC maker to see when you're covered.

CANON IS COOL

MICHAEL HIRSCH OF Parsonsburg, Maryland, wrote to us about his Canon BJC-610 color ink jet printer, which he bought in November 1995. Twenty months later he had a problem with the printhead. He called Canon's tech support. "The technician authorized a remanufactured printer to be sent the next day, but I received it less than 24 hours later."

EXTEND YOUR WARRANTY?

EDWARD HEINS OF Huntington Beach, California, wished he had paid for an extended warranty when he bought a PC for his daughter. Heins picked up a refurbished demo unit—a no-name 486 on display at CompUSA. He ran into trouble with the hard drive after a year. Heins had to fix the problem at his own expense because the hard drive was out of warranty. If he'd paid $59 or so for an extended warranty, he would have saved himself the hassle of getting the drive fixed.

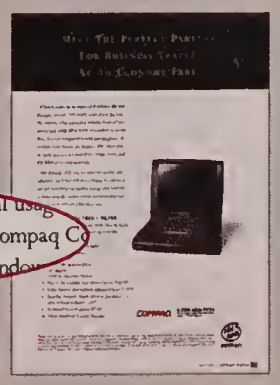
Think you've gotten a raw deal—or a great one? PCW Advocate *wants to hear the details at advocate@pcworld.com. We'll investigate complaints and publish items of the broadest interest. Aoife McEvoy is an associate editor for* PC World. ■

THE FINE PRINT

HITTING THE ROAD ABROAD? KNOW YOUR OPTIONS

IF YOU'RE ON THE ROAD, you depend on your notebook PC big time. If something goes wrong, you need road service. Will you be able to get it? According to the fine print in this Compaq Armada ad, service in the United States is great. But overseas, your options are rather limited.

If you're in the United States and a Compaq technician determines that your notebook needs repairs, the company will have it picked up, dropped off at an authorized service center, repaired, and returned to your hotel, at no cost to you.



If you're overseas, though, you'll have to lug your PC to the nearest authorized Compaq service center and then pick it up when it's fixed.

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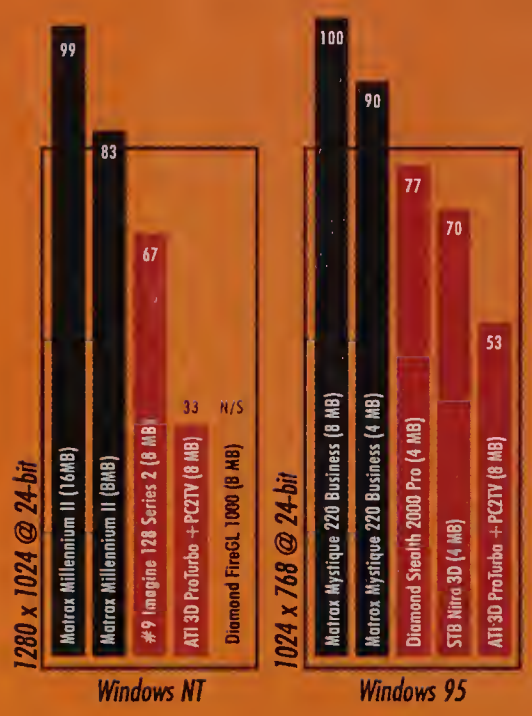

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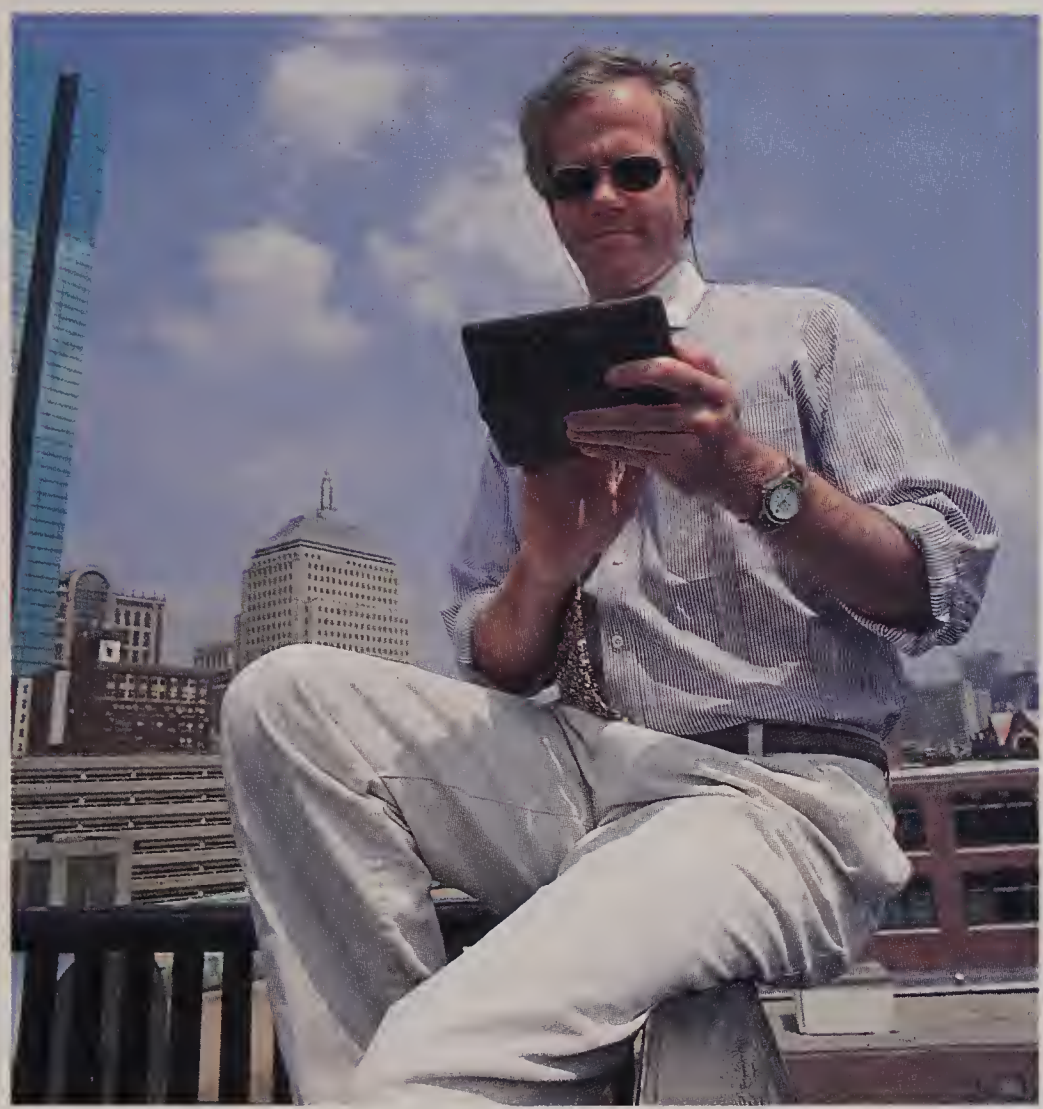
How to Make Your Laptop Lighter

Who wants to lug an 8-pound laptop for simple e-mail and memos? Dave Strickler found a 10-ounce handheld PC that offers all he needs on the road.



PHOTOGRAPH: SETH RESNICK

THE PROBLEM Notebook PCs have become as powerful as their desktop counterparts, but carrying a laptop on business trips can be a real drag. For Dave Strickler, president of DWS, which installs and supports Novell's GroupWise e-mail systems for Fortune 1000 companies, his notebook's slow booting process and brief battery life, not to mention his sore shoulders and airport security delays, made him yearn for something else. The answer, Strickler found, fit in the palm of his hand. —*Editor*

My Toshiba Pentium-120 notebook has it all: 48MB of memory, a 1GB hard drive, a CD-ROM drive, and a crisp active-matrix screen. It also weighs 8 pounds. That may not sound enormously heavy, but when you travel as much as I do on business—about two or three days a week—that 8 pounds quickly begins to feel more like 80 pounds.

And when I'm not using the notebook on the plane—usually because the battery has died—I have to hassle with where to store it. Under the seat, where it takes up precious foot room? Or in the overhead compartment, where it's hard to reach and I worry about its being stolen?

Also, if I'm in an airport and just want to look up a phone number or check my schedule, I've got to find a seat, wrestle the thing out of its case, and wait 45 seconds to a minute for it to boot up. Same problem if I'm waiting at the gate and want to jot down an idea. And when I run my notebook through an airport X-ray scanner, I'm often asked to open it up and turn it on—yet another delay.

What I longed for was a computer that was small, light, and as easy to use as a notepad.

THE SOLUTION: A HANDHELD PC

I DECIDED TO CHECK out some palmtop computers that use the Microsoft Windows CE operating system. I thought they'd be easy to use because they have the Windows interface. Instead, I found them irritating. The Windows icons were terribly small; trying to tap them with the stylus was extremely frustrating. I also considered a stripped-down subnotebook. But while the models I looked at offered the features I needed, they were still too big.

Finally, I came across the Psion Series 3c handheld computer. I immediately felt comfortable with the interface; it was by far the best I'd seen on a palmtop. With the Psion, you don't have to use a stylus. Instead, there's a strip of application icons along the bottom of the screen. You just use your finger to touch the icon you want, and instantly that application opens—a much easier and faster method than using Windows CE.

The Psion palmtop met my needs in other ways as well. It turns on as fast as a light bulb. It weighs just under 10 ounces. It's so small that the airport security guards don't ever hassle me to turn it on. It uses two standard AA batteries, which last for a month and a half of heavy use. And it comes equipped with many useful ▶

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applications, such as a Microsoft Word–compatible word processor; a spelling checker and thesaurus; a spreadsheet program that's compatible with Microsoft Excel, Lotus's 1-2-3, and others; a calculator; a calendar; a to-do list manager; and a contact database.

Most of the time, the Psion's built-in software has been all I need. I only wish that creating formulas in the spreadsheet were easier; the present process is just too tedious.

Before I leave on a trip, I hook up the Psion to my desktop PC using the serial port cable that comes with Psion's optional PsiWin connectivity package. [According to a Psion spokesperson, retailers are currently bundling the PsiWin package with the Series 3c at no extra charge. —*Editor*]

With the PsiWin software that I installed on my Windows PC, all I have to do is drag and drop files between the two systems. The Psion Series 3c appears as an icon on my Windows desktop, so the drag-and-drop process is easy. As I drag from my desktop to the Psion or the other way around, the file gets converted automatically. If I drag a Psion word processing file to Windows, for instance, the file is instantly converted to the Microsoft Word format.

When I open the file in Word, all the formatting—such as boldface type—remains intact. I've had problems with some of my more complicated Word files, however: The tables in such files, for instance, are automatically stripped out during the Psion conversion process. Because of this, I usually transfer documents from the Series 3c to my Windows PC and not vice versa.

ACCESSORIES THAT IMPROVE

WITH ANOTHER PROGRAM, Advansys Pty Limited's LinkWise, I can exchange data between my Psion and Novell's GroupWise e-mail system. [With Psion's optional PsiMail Internet package, Series 3c users can send and receive e-mail through the Internet, or exchange messages with corporate e-mail systems based on Lotus cc:Mail or Microsoft Mail or with others running PsiMail. —*Editor*] I tell LinkWise to synchronize my GroupWise calendar, contact, and to-do data with the Series 3c. After a couple of minutes, the synchronization is complete and I'm ready to go.

For e-mail, I bought the Psion Travel Modem. This peripheral lets me dial in to my company's GroupWise e-mail server and retrieve both my interoffice messages and any POP3 Internet e-mail. The modem's speed is only 14.4 kilobits per second, but that works fine for simple text messages, which is what I usually get. I can use the Psion to send notes as well—its e-mail messages look like those of any other program I've used.

> My **Psion palmtop** flows with the way I think and work. If I **suddenly** get an idea while I'm **racing through** the airport, I can quickly write a few **notes.**

Best of all, the Psion Series 3c works with my Sky-Tel two-way wireless pager. When I connect the two using Scanco's PalmPage software (which Scanco developed with Psion), I've got a great wireless e-mail system.

The Psion Series 3c keyboard has what I'd call "advanced Chiclet" keys. In fact, the keyboard is the biggest drawback I've experienced with the Psion. It's fine for typing out a few sentences in an e-mail message or for editing a document using the pecking method. But it's easy to make typos, and by no means is it comfortable enough for touch-typing. The newer Psion Series 5 has a keyboard with keys almost as large as those you'd see on a laptop; I'm planning to upgrade for that reason alone. [Psion plans to continue selling the Series 3c model in addition to the newer Series 5 palmtop. —*Editor*]

The Series 3c's screen (480 by 160 pixels) is admittedly tiny, but Psion has added a nice zoom feature. When your eyes tire of focusing on that small type, you can enlarge the text or spreadsheet cell you're working on. You can also turn screen backlighting on, which I sometimes do when I'm traveling on a plane at night. Unfortunately, however, the Series 3c's ▶

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screen isn't very legible in bright sunlight.

A palmtop isn't as powerful as a laptop, for obvious reasons, so I've had to scale down the size of the documents and the amount of data I take on the road. For longer trips, I take both the Psion and my notebook. I use the Psion during the day as I move from one appointment to the next. And I use the notebook for doing more data-intensive work when I'm at an office or a hotel room desk.

Although using a handheld computer presents some problems of its own, the advantages easily outweigh them. With a palmtop PC, I can work while I'm standing in line at the bank or waiting for my flight to depart. It lets me take advantage of what often used to be small segments of downtime in my travel days.

More important, my Psion palmtop flows with the way I think and work. If I suddenly get an idea while I'm racing through the airport, I can turn on the Psion and quickly write a few notes in its Jotter application. When I was relying on my laptop, I often forgot what I wanted to write by the time it finished booting—assuming I took the time to stop, sit down, and boot it up at all. And who can afford to lose even one good idea in these competitive, fast-paced times?

Edited by James A. Martin

Psion Series 3c

(with 2MB of RAM) $399 street, PsiMail $149 street, PsiMail Internet $59 street, Psion Travel Modem $249 street, PsiWin $99 street; Psion Inc.; 800/997-7466; www.psion.com

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LinkWise 2.0

$77 list; Advansys Pty Limited; 61-02-9968-2991 (Australia); www.advansyscorp.com

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James A. Martin is a PC World *contributing editor. If you've solved a problem in your business using a PC application or hardware device, we'd like to hear about it. We pay $300 for published columns. See page 14 for contact information.* ■

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WordPerfect Suite 8 fixes ◆ More browser bugs ◆ More Nuts & Bolts torques

Corel Perfects WordPerfect Suite 8

WITH FIXES FOR Microsoft Office 97 and Lotus SmartSuite 97 already out, it was only a matter of time before Corel's WordPerfect Suite 8 joined the ranks of the patched. The original version (8.0.0.153) included a coupon for the nearly free ($9.95 shipping fee) CorelCentral communications add-on. Send in the coupon and fee, or call 800/772-5735, and you'll receive a CD-ROM containing not only CorelCentral but also an update for WordPerfect. Revision B (version 8.0.0.225) contains hundreds of bug fixes and enhancements. If you object to paying for bug fixes, at least download the free 444K WordPerfect Suite 8 Service Pack 1 (ftp.corel.com/pub/wordperfect/wpwin/8/wp8sp1.exe), which fixes two of the biggest snafus that revision B solves: WordPerfect Suite 8 sometimes prints blank pages instead of your document, and displays an 'invalid page fault' error when you try to print some documents containing fully justified text.

THIS MONTH'S BROWSER BUGS

IT JUST WOULDN'T BE *Bugs and Fixes* if I didn't mention a browser security hole. A Singapore researcher found that Netscape Communicator's LiveConnect feature, which allows JavaScript code and Java applets to communicate with each other, opens a security breach similar to the problem described in last month's column. The Singapore or Tracker bug doesn't affect earlier versions of Netscape Navigator or any version of Microsoft Internet Explorer. A similar breach, called the Santa Barbara bug, also allows hackers to observe URLs and other data you type into Navigator. Netscape has duly released Communicator 4.03 (home.netscape.com/download/client_download.html), which fixes both bugs.

Meanwhile, Microsoft announced on August 12 that all of its Internet Explorer 3.0 and 4.0 browser versions for Windows 3.*x*, 95, and NT 3.51 and 4.0 are susceptible to attacks from Java hackers. Specifically, cleverly written Web sites could download images from or run Java applets located on other servers that you have access to. The hole also allows a Java applet to load Java code located on other systems on your intranet.

Is this a problem that jeopardizes any data in the real world? The mind boggles. In any case, Microsoft has issued updates to IE 3.0 and 4.0 that close the hole. See www.microsoft.com/ie/security/javamischief.htm for the latest details and patches.

NUTS & BOLTS REQUIRES EVEN MORE TIGHTENING

SEPTEMBER'S BUGS AND FIXES reported that the version 1.01 upgrade to Helix's Nuts & Bolts solved numerous glitches in the system maintenance utility, including programwide incompatibility with the FAT32 file system. But apparently, the upgrade did not fix enough of them.

A Helix source confirms that the company is finished with a new patch that fixes even more problems. Version 1.03 should be available by the time you read this—or soon thereafter—from the Nuts & Bolts Product Updates page on Helix's Web site (www.helixsoftware.com/n&b_updates.html). Among the fixes:

- The Discovery module no longer displays incorrect sizes for hard drives larger than 4GB.
- DiskTune now won't trip over sectors marked as bad, and is fully compatible with partitions created by PowerQuest's PartitionMagic utility.
- DiskTune now prevents a potentially disastrous incompatibility with the Stacker disk compression utility.
- The DiskEdit, Registry Tune-Up, and Cleanup modules all received minor fixes and enhancements.

In addition, Nuts & Bolts 1.03 includes a new Unformat utility and a free copy of Cheyenne Antivirus 5.0. To order the update on CD-ROM, call Helix's customer service at 718/392-3100.

Files from this article are available on PC World Online (www.pcworld.com/files). Scott Spanbauer is a senior associate editor for PC World. ■

IN BRIEF

Office 97 Service Release Interruptus

MICROSOFT YANKED THE Office 97 Service Release patch from its Web site in early August due to a rare file-save bug that the patch introduces in Word 97. A repaired version appeared in late August, as did a 750K patch that fixes the bugs in the original patch. Both are available from www.microsoft.com/Office/Office97/ServiceRelease.

Catching Up With Corel

COREL RECENTLY POSTED a 75K patch (pp7468.exe) to its Photo-Paint program that solves a problem with text images becoming corrupted on Pentium MMX systems. You can also find several older CorelDraw 7 fixes on that Web page (www.corel.com/products/graphicsandpublishing/draw7/library.htm).

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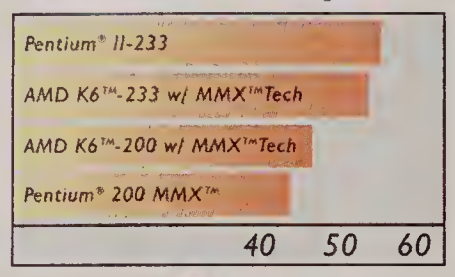

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ANALYSIS

USING AN OFFICE suite can be a big waste of time and money. The current products from market leaders Microsoft, Corel, and Lotus include hundreds of features that most people will never use. According to vendors, the typical customer uses as little as 5 percent of a suite's features. All those unused capabilities create a variety of problems. Daring souls who want to try out a new feature may stumble aimlessly through a morass of menus, cryptic icons, and unhelpful help screens. And because they require ever-larger hard disks, more RAM, and faster processors, these bloated packages can also drive up PC costs. As systems and software get more complicated, supporting the products has become a major headache for corporate IS departments.

BATTLE PLANS

IN THE COMING MONTHS, the big three suite makers plan to tackle these problems with new tools like Sun's Java programming language, along with new developments such as easy-to-use browser interfaces. Suite vendors also will introduce products designed for networked installations that let companies use network computers and older 386- and 486-based PCs to run the latest suites' applications from a network. Lotus and Corel have disclosed plans for products they expect to ship as early as year-end. At press time Microsoft was uncharacteristically quiet about its plans (see "Microsoft Rising to the Challenge?").

The next round of suites will likely include modified user interfaces that help you better navigate through the clutter. Look for browserlike interfaces similar to those introduced by Microsoft in Internet Explorer 4.0 and the upcoming Windows 98. Additions such as forward and backward buttons should make it easier to locate files and features.

Also look for suites that better adjust to match what you're doing. Over the past few years, all suites have made progress in "context sensitivity," showing on screen only the options that relate to the task you're currently performing. But that approach hasn't always worked because there are so many tasks and features. Lotus claims that the next incarnation of SmartSuite, which won't appear for at least six months, will include features designed to provide seemingly contradictory abilities—they're easier to use while making you more productive.

One such feature, the so-called "sticky file format," will save time and eliminate steps when you work with different types of files. This feature, which 1-2-3 97 and Word Pro 97 will support, lets you open a file created in another application and save it back to its original form automatically—without having to worry about formats. For example, if you open a Microsoft Word file in Lotus's Word Pro, you can work on the file and select File•Save, and the document is automatically saved in the original Microsoft Word format. Currently, if you save a file created in another application, you must follow a multistep process requiring you to select File•Save As and then choose the appropriate format.

JAVA UNDER THE HOOD

UNLESS YOU'VE BEEN living on an asteroid for the past year, you'd be hard-pressed to avoid all the press coverage on Java. Developed by Sun Microsystems, Java is a controversial programming language that offers several attractive features. First, applications that are written in Java can, in theory, run on any computer or operating system that includes a simple piece of software called a Java Virtual Machine de- ▶

Corel and Lotus aim to challenge Microsoft with browserlike interfaces and new Java and networking technologies that make their office products better, not bigger—or so they hope.

EDITED BY
Charles Piller, Randy Ross, and Bill Snyder

JUST IN

Windows 98 Delayed

MICROSOFT PLANS TO push back the launch of Windows 98 from the first quarter to the second quarter of next year. The vendor said the delay allows it to ship Windows 98 upgrades for both Windows 3.1 and Windows 95 users simultaneously. Initially, Windows 98 was going to ship with software for upgrading from Windows 95 to Windows 98, with the Windows 3.1 upgrade to follow three to six months later. At press time, it was unclear whether there would be one package for both upgrades or two separate packages. Microsoft said that customers and resellers wanted both upgrades to be available simultaneously, and hence it changed the ship date.

DVD-RAM Spells Confusion

THE FIRST REWRITABLE DVD drives could be on store shelves by year-end and bundled in PCs by the first quarter of next year. Hitachi, Toshiba, and Panasonic have demonstrated DVD-RAM drives and claim to have shipped samples to system makers for evaluation. DVD-RAM discs can store 2.6GB per side. List prices are expected to start at about $800. In addition, DVD makers are working on the next genera-

INTERNET

online

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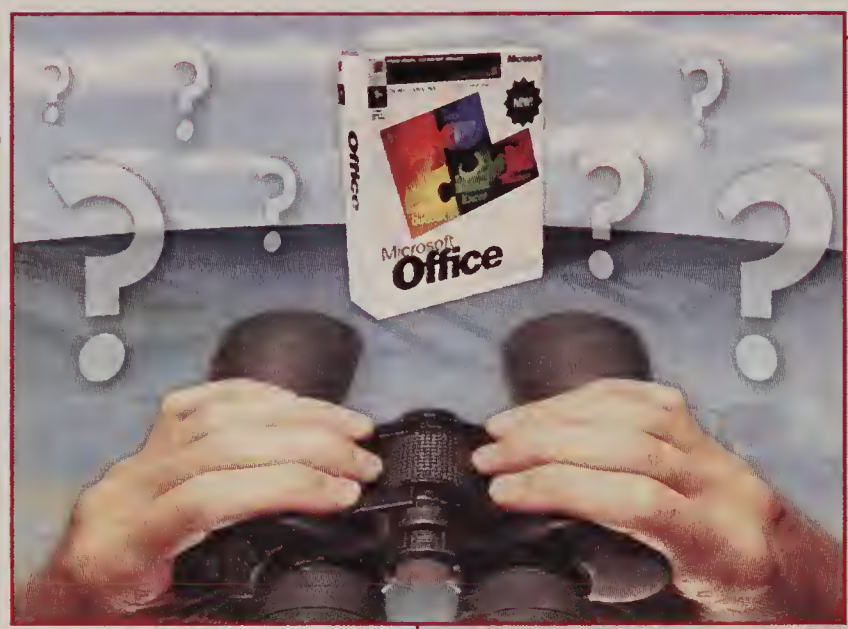


Microsoft Rising to the Challenge?

EVEN THOUGH IT owns some two-thirds of the market for office suites, Microsoft recognizes the problems with existing software suites. The company's Office suite won't ship for more than a year, but company representatives discussed several key technologies that may appear in future products.

The next version of Office will likely include a self-repair feature that works as follows: If you accidentally deleted system files, your software could retrieve new versions of the files from a server. If you weren't on a LAN, the software might prompt you to insert a disk containing the missing files.

In addition, an improved installation program would let you load only what you need. So if you wanted to create a chart and had

signed specifically for that system. The latest Web browsers from Microsoft and Netscape have built-in Java Virtual Machines that run animations and interactive applets that some Web sites provide.

But problems exist. Currently the JVM for Windows 3.*x* is primitive and inefficient, flying in the face of the promise that companies could use older hardware for running Java-based applications.

In corporations, Java—again, theoretically—is attractive for a number of reasons. It's designed to run efficiently over a network, thus leading to reduced network traffic, fewer crashes, and better performance. Improved performance may mean you can run suite applications effectively from a central server instead of storing them on a PC, thereby using up less hard disk space. And storing applications on a server makes upgrading and managing them easier for harried system administrators.

Java applications will likely be smaller and simpler because they will focus on specific tasks instead of laundry lists of features. These simpler programs can potentially lower the cost of training employees to use them, and shouldn't require gigantic amounts of processing power or memory to run properly.

For individual PC users, Java promises other benefits. Instead of installing or running an entire application, you may be able to select only those features that you really need for a given task. For example, you might install a Java component for jotting a quick memo, instead of resorting to a word processor packed with desktop publishing features you'll never use. You might load a basic expense-report component instead of an entire spreadsheet packed with trigonometric functions. The real kicker of this approach? As your needs change, you'll be able to modify or update your components easily.

> To address very **different types** of users Corel plans to introduce **new products** for NCs and PC-based workgroups.

These are Java's promises. At present the technology is largely untested for bigger, complex applications like software suites. Few Java apps currently exist; those that do are generally very simple applets available on some Web sites.

COREL CHANGES GEARS

JAVA GOT A BIG boost late last year when Corel announced it would create a completely Java-based suite, which the company dubbed Office for Java, consisting of a word processor, a spreadsheet, a

NEW APPROACHES TO BUSINESS SOFTWARE

PRODUCTS	Availability	Description
Corel Alta 800/772-6735 www.corel.com	summer 1998	Intranet groupware product; for workgroups, it will feature a Web-like interface; CorelCentral PIM; universal in-box for faxes, voice mail, and e-mail; and scheduling and work-flow tools.
Corel WordPerfect Suite 8 Enterprise Edition 800/772-6735 www.corel.com	winter 1997	Network version of WordPerfect Suite; for corporate users, it will include Java technology, which lets NCs and PCs—even 386-based systems—run WordPerfect Suite apps more efficiently off a server.
Lotus Kona 800/346-1305 www.lotus.com	winter 1997	Java-based suite for networked computers; for less experienced users, it will include a scaled-down version of common desktop apps, such as a word processor and spreadsheet. Expect a stand-alone PC version in 1998.
Lotus SmartSuite 98 800/346-1305 www.lotus.com	summer 1998	Next version of Windows suite; it's expected to feature a browser interface, "sticky file format" for managing disparate document types, and Kona applets.
Microsoft Office (next version) 206/882-8080 www.microsoft.com	spring 1999	Product may include new collaboration tools, improved installation, and self-repair features that automatically reinstall key files from a server if a user accidentally deletes them.

PHOTO ILLUSTRATION: JEFF BERLIN

not installed the charting feature, you could click the chart icon in, say, a spreadsheet, and the software would either retrieve the charting capability from a server or prompt you to insert a disk containing the program.

A related tool would provide support for workers who frequently travel from one branch office to another. This roaming feature keeps your user preferences on the company server. This means you could sit down at any networked PC, log on, start Office, and access things like your favorite macros or a personal spelling checker.

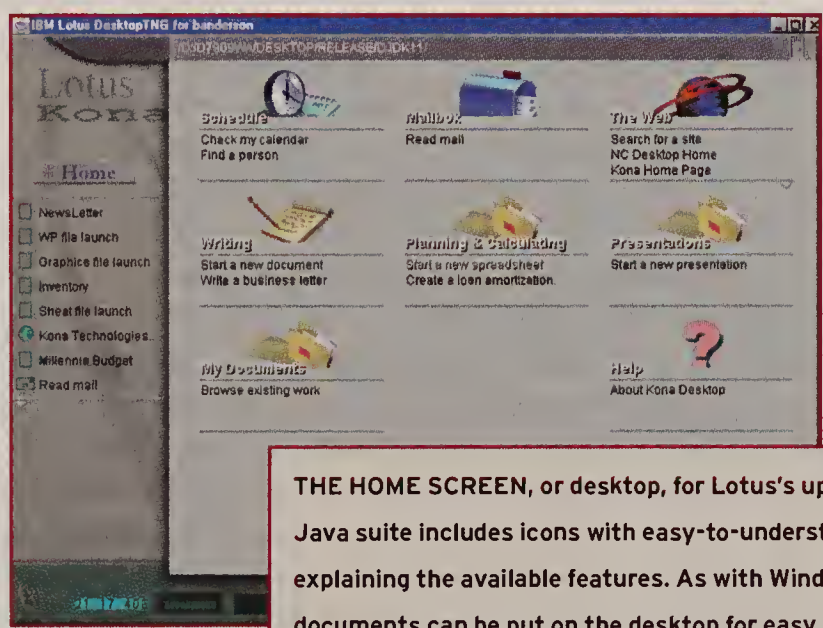
Microsoft is developing a product, code-named Hydra, that lets PCs with limited power—such as 386-based systems—run Windows 95 and NT apps from a server.

Beyond that, Microsoft is exploring the use of artificial intelligence in upcoming suites so they can more closely track the way you work and adjust interfaces accordingly. For example, if you type 'Budget 97', the software might load the Budget 97 spreadsheet as well as the tools for editing that document. The company has an internal development tool called MindNet that analyzes the meaning and context of some 7 million words and phrases; based on its interpretations, it makes decisions about what users are doing and will likely do next.

Microsoft is also experimenting with what could be the simplest interface of all—a blank screen. (The interface and navigation tools that next appear would depend on what you start typing.) It's not as radical an idea as it may seem: Loyal users of the early DOS versions of WordPerfect were attached to its ultraclean interface, which sported just page and line numbers tucked away in a corner. In the software game, the best ideas get recycled.

database, and other common applications. Prerelease bits and pieces of the suite had appeared on Corel's Web site earlier this year, but in August the company stopped development on it. Chris Biber, Corel's director of strategic alliances, says that the company took the step because research showed that users didn't want fewer and simpler applications—they wanted to make better use of the features in existing and future Corel WordPerfect suites.

Corel hasn't given up on Java; the company has just changed its focus. To address different types of users, Corel plans to introduce two new products (its two existing lines are the standard and professional versions of its current flagship, WordPerfect Suite 8).

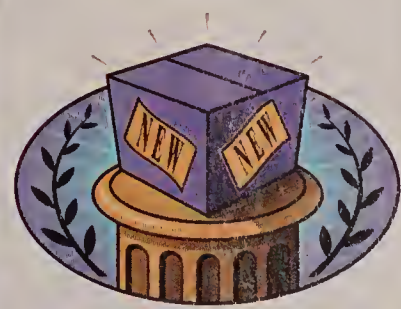


THE HOME SCREEN, or desktop, for Lotus's upcoming Java suite includes icons with easy-to-understand text explaining the available features. As with Windows 95, documents can be put on the desktop for easy access. Here, documents such as 'NewsLetter' and 'WP file launch' are listed on the left side of the screen.

For corporate customers, Corel is developing WordPerfect Suite 8 Enterprise Edition, which includes a new technology, code-named Remagen, that's designed specifically for use on networked computers. Remagen will allow users of NCs, Macs, Windows-based PCs, and even older systems powered by 386 processors to run *any* application (including current and future Windows apps) from a network server. It may even allow home-based workers and travelers using portable computers to access applications through the phone lines. Although this capability isn't new, Corel claims that Java's minimal impact on network traffic should speed up remote access, both over standard phone lines and in Internet connections. Remagen should be available sometime during the winter; Corel hasn't yet announced pricing for the product.

Corel is also busy developing another product, code-named Alta, that is geared toward workgroups and is focused around CorelCentral, a personal information manager and scheduler that ships with WordPerfect Suite 8. Although specifics were sparse at press time, Corel says that Alta will sport a Web-like interface ▶

tion: 4.7GB DVD-RAM drives, due to ship in 1999. But DVD-RAM won't be the only game in town: Six drive makers, including Hewlett-Packard and Sony, announced a rival rewritable DVD technology, DVD Rewritable or DVD+RW, that will not be compatible with DVD-RAM. Also, NEC plans to ship its own proprietary rewritable drives in 1998.



Thinnest Notebook Ever

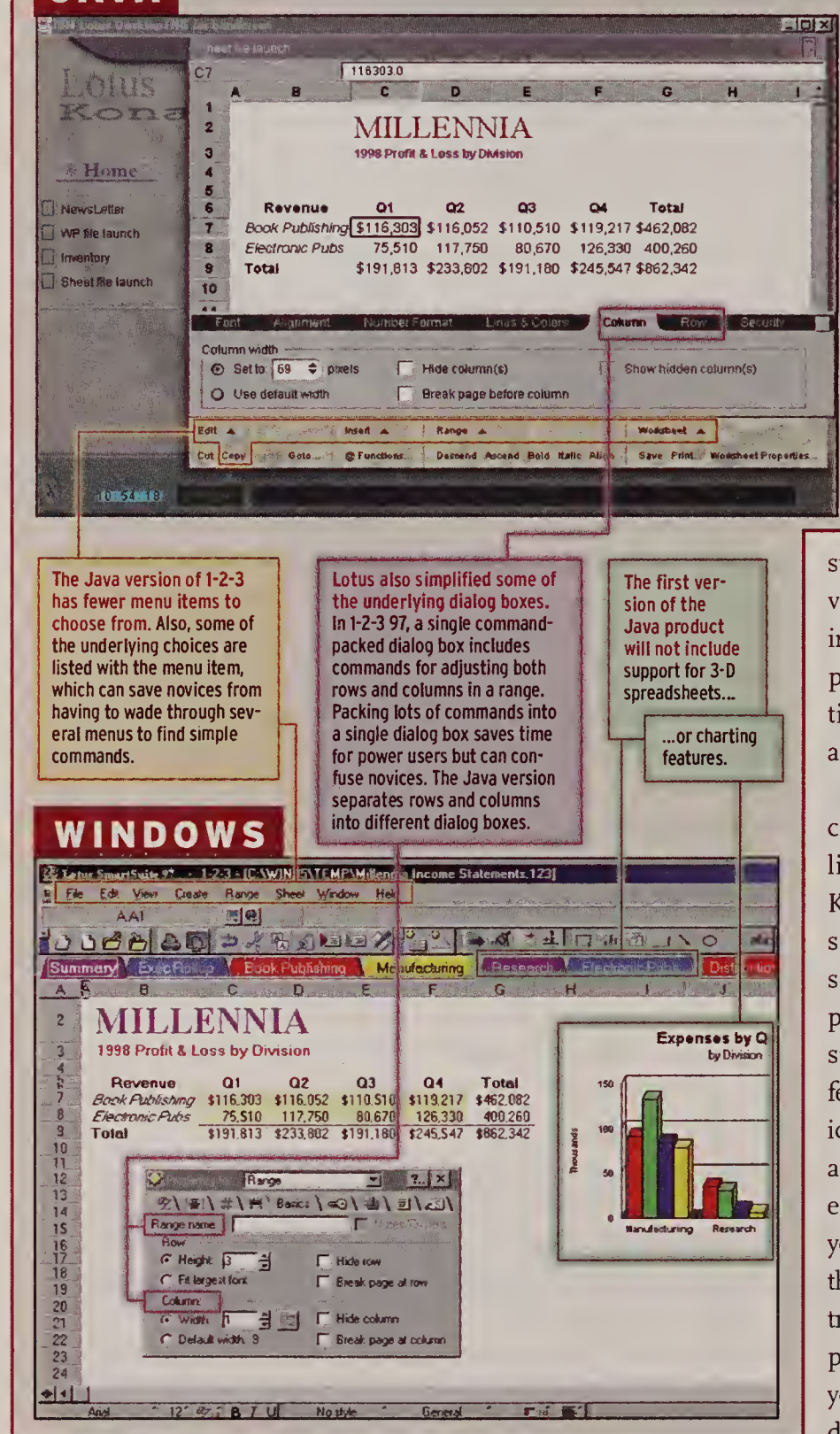
HP HAS DEMONSTRATED a notebook that weighs 3.1 pounds and measures less than ¾ inch thick. The lightweight device includes a 12.1-inch active-matrix display. HP expects to ship a notebook incorporating the thin technology with either a 200-MHz or a 233-MHz mobile Pentium MMX processor during the first quarter of 1998. Though the device is expected to offer a full-size keyboard, analysts were concerned that the notebook's thinness might affect the keyboard's quality and feel, and would make typing long documents tedious.

400-MHz Alpha PC for $2500

ABOUT NINE VENDORS are expected to announce PCs based on Digital's fast Alpha 21164PC chip, the first Alpha systems in the $2500 price range. Digital would not release the vendors' names at press time. The systems require Windows NT. Using translation software, the PCs can run x86 Windows 95 programs as fast as a 200-MHz Pentium Pro, Digital claims. ▶

1-2-3 Interface Evolves

THE JAVA VERSION OF 1-2-3, which debuts in a suite code-named Kona, is designed to be simple to use and easy to navigate. Intended for less experienced spreadsheet users, the Java version includes fewer features and commands than its predecessors. As a result, spreadsheet jockeys will be better off with a full-blown version of 1-2-3, such as the one offered in the current Windows suite. Here's how the Java version of 1-2-3 compares to the latest Windows version, 1-2-3 97 for Windows 95.



and will likely include a universal in-box that holds faxes, voice mail, and e-mail messages; group calendaring and scheduling components; a Web browser; and workflow and data analysis tools.

LOTUS DOES JAVA

MEANWHILE, LOTUS IS forging ahead into the territory that Corel left behind, with a true Java-based suite that offers a simpler interface and fewer features than the vendor's suites for Windows. Lotus's new suite, which is code-named Kona, is expected to run on NCs as well as on PCs and Macintoshes. Kona is scheduled to ship by year-end.

Kona's Java-based applets aim specifically at networked users. As we went to press, Kona's exact components were still being decided, but an early version that Lotus showed us includes a spreadsheet, a word processor, a PIM, e-mail functions, presentation graphics, and a project scheduler.

However, the exact mix of components and features is likely to change by the time Kona ships. In this early version, Lotus simplified on-screen navigation. The word processor and spreadsheet sport bare-bones menus with fewer commands than you typically find in similar Windows apps. Many commands are listed on the screen. This means you don't have to burrow down through several menu layers or try to decipher cryptic icons to perform basic tasks, the way you have to do with many Windows applications. As with popular browsers, when you move the cursor around the screen, available features become highlighted. These features won't mean much to experienced PC users, but they may help beginners get up and running.

When users click an application on the Kona desktop, it will be loaded from the server and will run locally. In keeping with the Java philosophy, each app offers only a subset of the features included in full-fledged SmartSuite applications, and isn't designed to replace them.

Lotus is still developing the full version of SmartSuite 98 and is concentrating on making Kona a tool that focuses on tasks performed by workgroup members—say, group scheduling or collaborating on reports and budgets.

Pricing for Kona wasn't available at press time, but the company plans to sell it on a per-server basis. In addition, Lotus will bundle Kona in SmartSuite 98.

CONFUSION REIGNS

IN THEIR EFFORTS TO simplify products, suite vendors will add confusion to what has been a relatively straightforward buying process. There will be more versions with different capabilities, and vendors will appear to be talking out of both sides of their mouths. First you'll see corporate versions of suites that use Java to run more efficiently over a network. At the same time, these companies will continue developing their stand-alone Windows suites. Vendors claim that customers are always looking for new bells and whistles. So despite all the usability rhetoric, upcoming Windows suites will have—you guessed it—lots more new features. Look for the next incarnation of Corel WordPerfect Suite next spring; Lotus SmartSuite 98 should appear by the second quarter of 1998. Microsoft is

Suite Revenge: Lotus, Corel Gain Market Share

IN 1996, PC USERS spent about $3.8 billion on office suites, according to IDC analyst Mary Wardley. About 89 percent of that money went to Microsoft. When you consider that this market is still growing—it should hit $4.5 billion by year-end—you can see why Lotus and Corel are fighting back.

In addition to developing new products, both vendors have been attempting to grab market share with aggressive pricing, Wardley says. In the chart below, note how these two vendors increased their share of suite shipments in 1996 without decreasing Microsoft's share of revenues (dollars collected for those shipments).

MARKET SHARE BY PERCENT

COMPANIES	1995		1996	
	Shipments	Revenues	Shipments	Revenues
Microsoft	82%	89%	66%	89.2%
Lotus	13%	7.4%	27%	5.9%
Corel	5%	3.6%	7%	4.9%

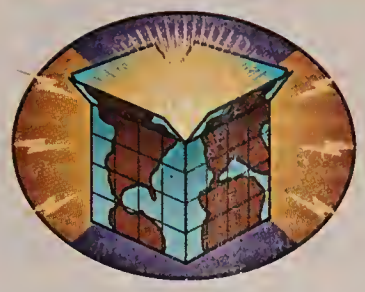
SOURCE: International Data Corporation

developing a successor to its Office 97 suite, although company reps would not discuss specific features or availability.

Expect Microsoft to be vociferous in its attacks on Java products. Despite Microsoft's cocky and confident corporate face, the bottom line is that you don't need Windows to run Java applications—a reality that threatens Microsoft's hegemony on the desktop. As we went to press, Microsoft developer Charles Simonyi was quoted as comparing Java to the 1960s pop group the Monkees. "They had a few hits and then disappeared. Java will be the same. It will be totally forgotten. Microsoft is the Beatles."

But the company has made an effort to improve its interfaces. Windows 98 will sport a browser-based Explorer and Help function. And the new suites from Lotus and Corel should heighten competition. However, the history of PC software is replete with broken promises of upcoming trends and technology, so a modicum of skepticism is in order. We'll have to wait to judge the products based on these new developments when they hit dealer shelves next year.

—*Stan Miastkowski* ▶



Tidbytes

NetPC Loses Momentum: IBM halted plans to ship a NetPC. Instead, IBM plans to ship a standard PC that offers key NetPC features, such as a sealed case. **CD-ROM Acts Like a Floppy:** HP's new SureStore CD-Writer Plus 7110 ($499 internal, $610 external) is the first CD-Rewritable drive to let you selectively delete files and folders. Existing drives erase an entire disk or nothing at all. **Jobs Takes Top Job:** Steve Jobs, Apple cofounder, was named interim CEO of the ailing Macintosh maker, while the search for a permanent executive continues. However, analysts remain mixed about the company's prospects.

Software Rentals Coming to an ISP Near You

IF YOU RARELY use certain applications—say, spreadsheets or presentation programs—wouldn't you rather rent them on a per-use basis than buy them outright? This idea, which is being tossed around by industry luminaries, isn't as far-fetched as it may sound. The groundwork has already been laid: Java technology that will be appearing in Corel's Remagen and Lotus's Kona promises small, simple applications that can run well over a network. Also, two companies—Lotus and Changepoint—already have server technology that lets Internet service providers rent software; some rentable applications are now available.

PHOTO ILLUSTRATION: JEFF BERLIN

However, these first products aren't everyday programs designed to run on stand-alone PCs. Instead, they're groupware applications that allow geographically dispersed workers to collaborate over the Web. Emerging Technology Solutions has the closest thing to a true rentable suite: Business In A Box is a collection of 20 applications including a contact manager, an expense report, a project manager, and a group discussion database; the suite rents for about $30 per user per month. Lotus's Instant Teamroom is a collaboration tool that can be rented.

The Truth About Renting

BUT IF YOU'RE LOOKING to rent standard business applications such as spreadsheets and presentation programs, put away your credit card—some significant roadblocks still exist. First, the licensing of most off-the-shelf software specifically forbids its being rented, and most major software developers are quite content to sell you the full packages for use only on your PC. Although industry visionaries predict per-minute rental pricing, this arrangement is still far in the future.

So far, ISPs have shown marginal interest in purchasing the Lotus or Changepoint server technology, which they load on their Web servers to enable applications to be rented. More important, there's been little demand for rentable apps on the part of large corporate customers, a key market segment that often drives PC innovation. Instinctive Technology, whose eRoom is similar to Business In A Box, surveyed potential customers about a rental option before introducing the product. The consensus: People preferred to buy eRoom and put it on their LAN.

AOL and WorldCom Swallow CompuServe: Good for Online Consumers?

CONSUMER

WHEN AMERICA ONLINE announced in September that it would acquire rival CompuServe's online service, the story wasn't just of a big fish swallowing a smaller one. The pending deal has enough players and moves for a who's-on-first routine. What's more, the transaction sharpens the lines between companies that provide telecommunications plumbing and those that deliver online content.

The ultimate effects of this new e-world order are unclear at this early stage, but one short-term benefit is that AOL subscribers in heavy-traffic dial-up locations should encounter fewer busy signals.

MEGADEAL

THE DEAL BEGAN with H&R Block's selling its controlling interest in CompuServe's online service and networking infrastructure to WorldCom, a large telecommunications company. WorldCom then turned to AOL, whose pipes clogged when AOL adopted fixed-rate pricing last year. In exchange for an AOL-owned network company, WorldCom will pay AOL $175 million and give it CompuServe Interactive, the online service. AOL also gets networking discounts from WorldCom, including use of up to 100,000 modems. So WorldCom gets CompuServe's and AOL's plumbing, and AOL gets CompuServe Interactive and its 2.6 million subscribers, increasing AOL's base to 11.6 million. What do users get? If AOL handles the transition smoothly, better service. That's a big *if*.

"[AOL is] saying this will give them more capacity; I'm not sure I believe it, based on their past performance," says David Cassel, who moderates a popular mailing list that's critical of AOL (www.aolsucks.org/list).

But most analysts agree that subscribers should experience fewer busy signals and fewer episodes of being disconnected midsession if the deal goes through. Improvement would come in part because of the boost in modem count and in part because AOL would turn over its network pipes to WorldCom specialists. "The access problems that [AOL has] had in the past should be mitigated," predicts Rebecca Wetzel, a network expert for TeleChoice, a consultancy located in Verona, New Jersey.

> "[AOL is] saying this will give them **more capacity;** I'm not sure I believe it, based on their **past performance.**"

Unfortunately, more modems won't help AOL's sluggish Web access, caused by inefficient network protocols and architecture.

AOL plans to continue operating CompuServe as a separate service. With a second brand, AOL looks less like an online service and more like the media company it wants to be. CompuServe Interactive will focus on small businesses and professionals, groups it has always served better than AOL. But it's too early to tell whether CompuServe's distinct identity will survive.

AOL CEO Steve Case says that some CompuServe areas may migrate to AOL. In a separate deal, AOL subscribers will get one new content element—surprisingly from Microsoft Network, AOL's last big competitor. MSN's online magazine Slate will soon appear on AOL; in return, AOL gets a spot on Microsoft Internet Explorer 4.0's desktop.

SAME PRICE, MORE ADS

WILL THE AOL-CompuServe consolidation drive up subscription prices? Not in the near future. AOL's move to $19.95-per-month flat-rate pricing last year was in response to ISP rates, not CompuServe's fee of $24.95 for 20 hours of use. Instead, the addition of CompuServe Interactive's subscribers lets AOL charge advertisers higher rates.

If approved by CompuServe shareholders and the Justice Department, the deal will mark the online industry's recognition that ad-wrapped content is more lucrative than connection charges.

AOL users may get greater reliability, but all online consumers would pay an intangible price: less competition in the information marketplace. Even the last two major commercial online services—AOL and MSN—are sharing content. This homogenization might prove that the online-service industry has matured. Now all it has to do is compete with the Web—that cacophonous, disorganized guarantor of diversity that still remains the largest threat even to AOL.

—*Jim Heid* ▶

ILLUSTRATION: RICHARD DOWNS

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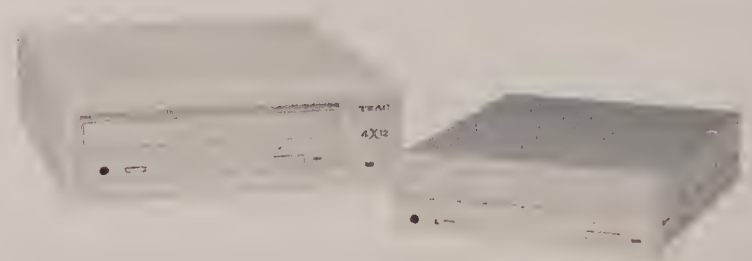

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Circle 87 on reader service card

K6-266 Challenges PII-266 on Price/Performance

WHEN ADVANCED MICRO Devices launched its K6 processor in April, CEO Jerry Sanders made an ambitious boast: Users would get performance equal to that of Intel's Pentium II for a lot less money. Judging by AMD's latest offering, he wasn't too far off.

We found preproduction PCs based on the new 266-MHz version of the K6 to be nearly as fast as systems powered by Intel's 266-MHz Pentium II. On average they were only about 7 percent behind Intel's best—the PII-300—for productivity applications.

BUILT FOR BUSINESS

THE FASTEST K6 system that we tested was CyberMax's $2399 BusinessMax A20 266, equipped with 64MB of EDO RAM and a whopping 1024K secondary cache. The BusinessMax zipped through PC WorldBench business application tests with an overall score of 256. For an extra $700 or so you net a niggling 2.4 percent increase in performance. For $1200 more you get a PII-300 system and enjoy a still slight 5.7 percent boost.

Digital's Venturis FX-2 and Polywell's Poly K6266Mx weren't quite as fast as the CyberMax, though with a WorldBench score of 253 the Poly was close. The Venturis scored 243, due to its puny 256K secondary cache and its early-beta status. Still, the average WorldBench score of the three K6 systems is a respectable 251, just 4.2 percent slower than the average PII-266 system using 64MB of RAM.

However, both AMD and Intel are getting WorldBench increases of 3 percent or less as they crank up the clock speed on their processors. When Intel upped its P-II from 266 MHz to 300 MHz, system performance rose by just 3 percent. On average, K6-266 systems are a scant 1.6 percent faster than those based on the K6-233.

THE CYBERMAX BusinessMax A20 266.

Meanwhile, Cyrix-based PCs also remain very competitive. The average for systems based on the Cyrix 6x86MX-PR233 slightly bested that for K6-266 models on our WorldBench tests (253 versus 251). And at an average price of $1999 for a loaded system, 6x86MX PCs look quite appealing.

MIXED MULTIMEDIA

ON MMX TESTING the K6-266 systems performed respectably overall: All three outperformed the average for PII-266 systems in rendering images in Fractal Design's Ray Dream Studio. But the K6-266s had twice as much RAM as the PII-266s. Even with extra RAM, the average for K6-266 systems was about 7 to 22 percent slower than the PII-233 and PII-266 units on images with Macromedia Director and Adobe Photoshop.

As you shop, remember that subsystems such as RAM, hard drives, and video cards, as well as the amount of secondary cache, all affect performance. And some software seems to make better use of the MMX instruction set developed by Intel, while other applications perform better when running on an AMD-based system, says Peter Glaskowsky, an analyst with MicroDesign Resources. Which CPU maker has the better MMX implementation? Our tests aren't conclusive, but with all things otherwise equal, PCs based ▶

Clarification: Defining the Fastest CPU for Photoshop

RECENTLY, *PC World* compared a prototype PC based on the Cyrix 6x86MX-PR233 processor with PCs using Intel's Pentium II-266 (see *Top of the News*, August). While the PII-266 machines outperformed the Cyrix unit in most business and multimedia tests, the tables were turned in a test of Adobe Photoshop's Gaussian blur. The Cyrix system did so well on this test that its overall Photoshop score (based on the Gaussian blur and two other tests) overtook those of the Pentium II-266-based systems.

To better understand this result, the PC World Test Center conducted new tests to determine the influence of test-file size and of two key subsystems—the hard drive and the video adapter.

We found that subsystems can substantially affect Gaussian blur tests, and that the effects are amplified with large files on relatively slow hard drives. The Cyrix system used an average graphics board, but did have a very fast hard drive that skewed its Gaussian blur results.

Without Gaussian blur, the PII-266 PCs clearly deliver superior performance. Due to the unusually strong influence of subsystems and file size on the Gaussian blur, we've removed that test from our MMX suite.

—The editors

PHOTOGRAPH: KEVIN CANDLAND

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Circle 121 on reader service card

K6-266 Systems: Approaching Pentium II Speed

PII-266: A HAIR FASTER FOR BUSINESS

SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	PC WorldBench score	Application test times (Faster ◀ ▶ Slower)
CyberMax BusinessMax A20 266	AMD K6-266	64	1024	256	
Digital Venturis FX-2	AMD K6-266	64	256	243	
Polywell Poly K6-266Mx	AMD K6-266	64	512	253	
Average of 7 desktops	Pentium II-300	64	512	270	
Average of 11 desktops	Pentium II-266	64	512	262	
Average of 2 desktops	Cx6x86MX-PR233	32	512	253	
Average of 7 desktops	Pentium II-233	32	512	247	
Average of 4 desktops	AMD K6-233	32	512	247	

Minutes 0 10 20

Word 7.0 for Windows 95 · Excel 7.0 for Windows 95 · Picture Publisher 6.0 for Windows 95 · Paradox 5.0 for Windows · WordPerfect 6.1 for Windows · 1-2-3 release 5 for Windows

K6-266: UNEVEN FOR MULTIMEDIA

SYSTEMS	CPU	Video RAM (MB)	Application test times (Faster ◀ ▶ Slower)	Macromedia Director 5.0 with MMX plug-in: Frames per second[1]
CyberMax BusinessMax A20 266	AMD K6-266	4		88
Digital Venturis FX-2	AMD K6-266	4		72
Polywell Poly K6-266Mx	AMD K6-266	4		81
Average of 5 desktops	Pentium II-300	2		96
Average of 6 desktops	Pentium II-266	2		93
Average of 2 desktops	Cx6x86MX-PR233	4		80
Average of 3 desktops	Pentium II-233	4		91
Average of 2 desktops	AMD K6-233	4		83

Minutes 0 1 2 3

[1]Higher is better. [2]4MB or BMB, depending on system.

Adobe Photoshop 4.0 · Fractal Design Ray Dream Studio 4.1

How We Test

BUSINESS APPLICATIONS: We tested all systems with PC WorldBench, PC World's Windows 95 application-based benchmark. Higher scores are better. For a description of PC WorldBench 1.0 tests, see PC World Online (www.pcworld.com/testing).

MULTIMEDIA APPLICATIONS: We tested each system using a series of MMX-enabled applications. In Adobe Photoshop 4.0, we time two image editing operations. In Fractal Ray Dream Studio 4.1, we time how long it takes to redraw rendered 3D scenes at two levels of complexity. In Macromedia Director 5.0, we play a graphics-intensive Director executable file.

Data based on testing conducted by the PC World Test Center. All rights reserved.

on Intel chips usually wind up winning the race.

There's one other graphics-related issue to think about: The Accelerated Graphics Port should speed up the graphics performance of software written to take advantage of it—once that software becomes available (see *Top of the News*, October). The newest Intel-based PCs support AGP; the K6 systems do not.

AMD expects to keep the price of its K6 CPUs and chip sets about 25 percent below that of comparable parts from Intel. This will let Digital sell the Venturis for about $2200 to $2300—it will lack a modem, but will ship with 512K secondary cache, a 24X CD-ROM drive, 64MB of SDRAM, a 3.2GB Ultra DMA /33 hard drive, and 2MB of video RAM on a S3 Trio 64 V2/GX card.

The Poly K6266Mx will ship as tested for $2288. It has 64MB of SDRAM, a 512K secondary cache, a 5.1GB Ultra-IDE Maxtor hard drive, 16-bit sound, a Matrox Millennium PCI graphics card, a 33.6-kbps modem, and a Sampo 17-inch monitor. The $2399 BusinessMax will ship with 64MB of SDRAM, a 6.4GB EIDE hard drive from IBM, a 17-inch MAG InnoVision monitor, a Matrox Millennium II card, and a 56-kbps modem.

The supply of K6-266 chips is tight right now, so you won't see many of these PCs until later this year. But if you need to save cash, consider waiting. The K6 remains a cost-effective, high-performance alternative to Intel offerings.

—*Bill Snyder*

• BusinessMax A20 266, $2399 street; **CyberMax;** 800/437-4596; www.cybmax.com

READER SERVICE NO. 797

• Poly K6266Mx, $2295 street; **Polywell;** 800/999-1278; www.polywell.com

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Strong Telecommute Option: 67-kbps Modem

56K? ISDN? Cable? Satellite? Just when you thought you understood all the high-speed communications options, Transend adds its 67-kilobits-per-second modem.

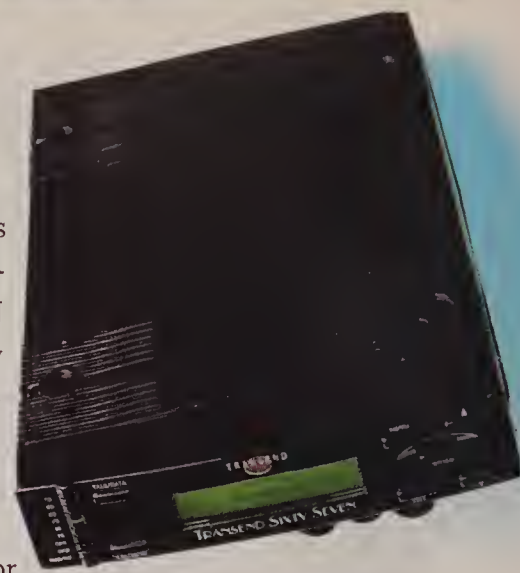
One thing is clear—casual Web surfers need not apply. The $395 Sixty-Seven must connect to another Sixty-Seven to run at its top speed, and few Internet service providers support the technology. The modem doesn't even offer 56 kbps as a fallback speed—33.6 kbps is the next step down.

The Sixty-Seven has good potential, however, for point-to-point setups such as connecting telecommuters to the office. Preliminary tests suggest that these modems make sense for companies seeking a technology that's faster than 56 kbps but cheaper to run than ISDN. Although 56-kbps modems were about as fast as the Sixty-Seven when downloading files through FTP, they can go no faster than their 33.6-kbps counterparts when sending data. But because it combines two phone lines, the Sixty-Seven can hit top speed in both directions.

BETTER THAN ISDN?

ISDN OPERATED two to three times faster than the Sixty-Seven in our speed tests. But ISDN is less widely available and usually much costlier than standard phone service, and the Sixty-Seven needs only a pair of common analog lines. Also, while ISDN modems can be fiendishly difficult to install, the Sixty-Seven took just a few minutes to set up.

Windows 95's Dial-Up Networking 1.2 (available for download from www.pcworld.com/files) also lets you tie two modems together to reach 67 kbps. This setup can save you money, and you can combine any make or model of modem you want. But it requires a PPP connection (which is common but not universal), whereas the Sixty-Seven modem works over any analog connection. The combined-modem setup also takes more effort, says communications consultant John Navas, because you need to configure each computer specially, and it works only when you can use PPP.



TRANSEND'S Sixty-Seven.

—Bryan Hastings, with research by Grace Aquino

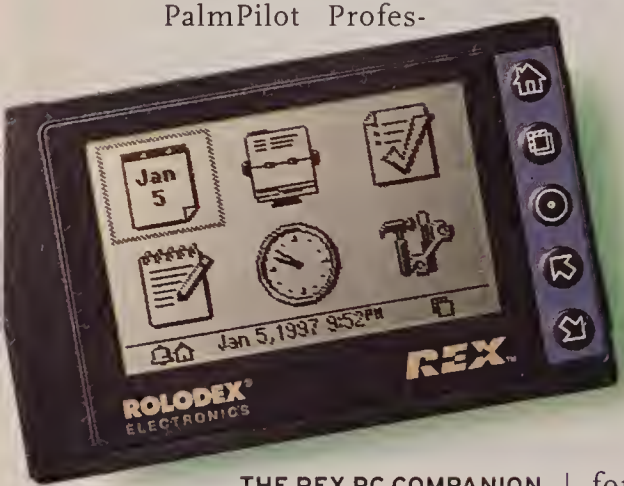
• Sixty-Seven $395 street price; **Transend;** 800/357-2671; www.transendmodems.com

READER SERVICE NO. 774

Your Life on a Card—PDA Pushes Size Limits

MY LIST OF to-dos and contacts seems to grow larger every day, but the space I need to carry it continues to shrink. For years I lugged around an unwieldy paper-based organizer. Last year I moved to the pocket-size PalmPilot Professional from 3Com/U.S. Robotics. And now with the release of Franklin Electronic Publishers' Rex PC Companion, I can carry around up to 2500 items downloaded from my PC—on a personal digital assistant that's no bigger than a business card.

Earlier PDAs, such as Sharp's Wizard, weren't up to the challenge of staying in sync with a PC for appointment, contact, and to-do lists. Franklin's Rex follows the pioneering PalmPilot approach by including its own desktop PIM program, called Rex TrueSync Information Manager, which allows you to import and then synchronize data from Microsoft Schedule+ and Outlook, Lotus Organizer, and Starfish's Sidekick.



THE REX PC COMPANION fits easily in your wallet.

ONE-WAY STREET

UPDATING DATA on the Rex is as simple as plugging it into a PC Card slot on a notebook or using its serial docking station with a PC. But the Rex synchronizes in one direction only: You can check off to-do items on the PDA, but all other data must be entered on the PC. If your schedule changes a lot, the Rex probably isn't for you.

Nevertheless, the Rex has some features that make it worth considering if you can live with the limitations. Although its 160 by 98 LCD screen allows for just 30 characters by 9 lines of text, the crisp, highly legible resolution makes viewing easy. Five miniature control buttons let you navigate fluidly from screen to screen; the calendar provides daily, weekly, and monthly views; and the vendor says the batteries are good for up to six months.

Franklin offers two models of the Rex, both with 160 by 98 LCD screens. The $130 Rex-1 holds about 750 items, while the Rex-3 handles up to 2500 entries. The docking station costs $39.95 or comes bundled with the $180 Rex-3.

—Michael S. Lasky

• Rex-1 PC Companion $130 street, Rex-3 PC Companion $180 street; **Franklin Electronic Publishers;** 888/739-6400; www.franklin.com

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MMX Software—All Play and Not Much Work

ANALYSIS

NINE MONTHS AFTER its splashy debut in a San Francisco art gallery, software using Intel's MMX technology still offers very little for the mainstream business user. The number of available MMX titles has more than doubled in the last few months—at least 126 products are now on the market, compared to just 50 in May. But more than 100 of these products are games, home improvement packages, or multimedia references.

SMALL CHANGES

MOST OF THE remainder are business oriented—if your business involves graphics or slide presentations, that is. The three major office suites—Microsoft Office, Lotus SmartSuite, and Corel WordPerfect Suite—all make some use of MMX technology. But the MMX enhancements are limited at best. "Whenever there's a new technology, developers go out and do the absolute minimum so they can make the claim," says Jeff Tarter, publisher of *Softletter*, an industry newsletter.

To be fair, Intel never promised a revolution in business computing with MMX. The company's highly visible marketing campaign featured an image (bunny-suited factory workers grooving to vintage rock 'n' roll) that was calculated to inspire viewers with a sense of fun. Nevertheless, many users expected more from what was billed as one of the hottest technologies of 1997.

MMX is a set of 57 instructions that speed up video, audio, and graphics tasks when you run software that uses them. Although Intel pioneered their use, MMX instructions are also used by CPUs from Advanced Micro Devices and Cyrix.

Because they have a larger internal cache, chips that support MMX are faster than non-MMX chips, even when running standard software. For instance, Intel's Pentium MMX processor has twice the cache of the original Pentium. A trial by the PC World Test Center (see "Which CPU Is Right for You?" May 1997) showed that standard applications run 7 to 10 percent faster on MMX machines than on Pentium machines. Software written specifically for MMX runs 23 to 44 percent faster than older versions of the same applications on MMX PCs.

> If you need to get some **old-fashioned work** done, those guys in the **bunny suits** won't be much help.

SUITE MULTIMEDIA

ALTHOUGH IT doesn't do much for word processing, MMX-enabled software that can help you do other parts of your job faster is appearing. Adobe, for example, has Photoshop, PhotoDeluxe, and After Effects. Then there's Micrografx Graphics Suite 2 and Director 6, an authoring tool from Macromedia.

And consider Corel WordPerfect Suite 8, the only office suite to offer more than token MMX functionality.

Paul Skillen, Corel's vice president of engineering, says MMX offers a huge benefit in the suite's presentation program. While you're creating your presentation, MMX speeds up screen redraw and bit-map editing. And if you present your slide show on an MMX PC, wipes and other special transitions will be faster and smoother. But that's about it, concedes Skillen.

Microsoft Office supported MMX with the release of Office 97 Service Release 1. This downloadable upgrade uses MMX for one job only: rendering JPEG files.

And by October, Lotus SmartSuite 97 will include a special Word Pro–integrated version of IBM's MMX-enabled ViaVoice speech recognition program. Lotus and Microsoft expect to add MMX enhancements in the future, but won't be more specific.

A lot more MMX games will be available by Christmas, including Psygnosys's G Police and Activision's Zork Grand Inquisitor.

So if you're looking for fun, MMX is finally paying off. But if you need to get some old-fashioned work done, those guys in the bunny suits won't be much help.

—*Lincoln Spector*

- Corel WordPerfect Suite 8 $395 list; **Corel Corp.**; 800/772-6735; www.corel.com

READER SERVICE NO. 771

- Lotus SmartSuite $399 street; **Lotus Development Corp.**; 800/343-4514; www.lotus.com

READER SERVICE NO. 772

- Microsoft Office $499 to $799 street; **Microsoft**; 800/426-9400; www.microsoft.com

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Instant Intranets: The Web as LAN Substitute

ANALYSIS

YOU NEED A private network, and you need it now. But you have neither the time nor the money to buy the hardware, let alone contend with the multitude of hassles certain to come your way when you try to set one up.

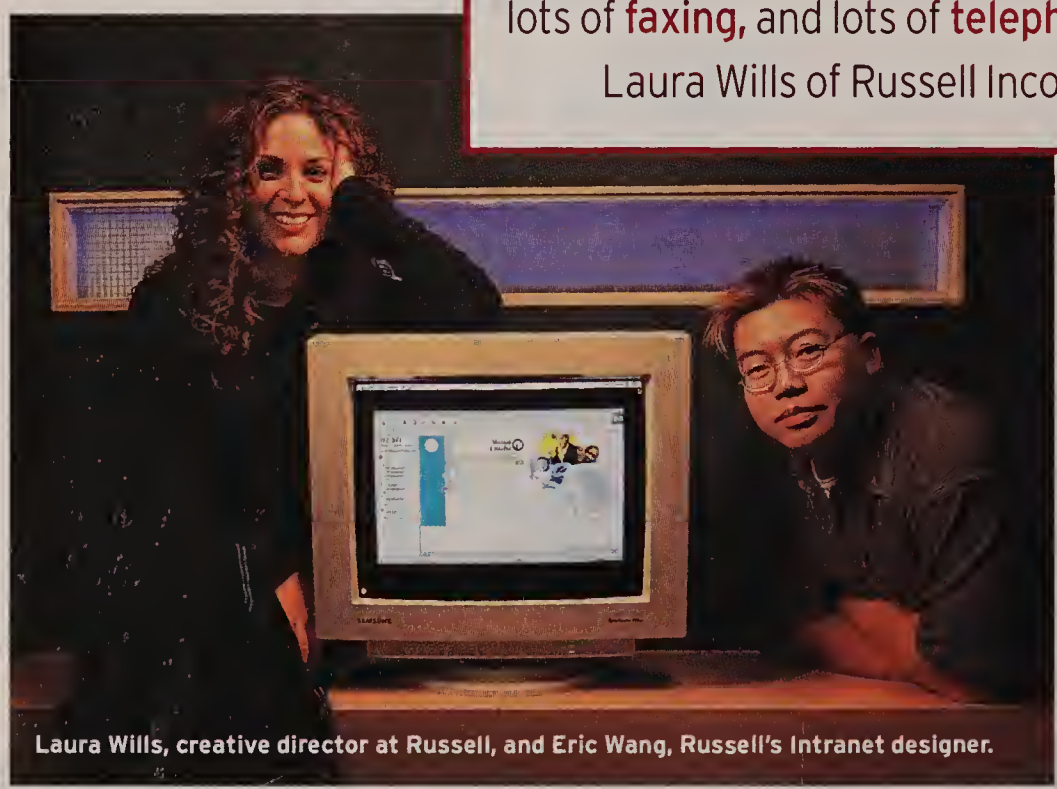
Relax—help is at hand. New Web-based groupware services from Lotus, Netscape, and at least one smaller vendor allow anyone with an Internet account, a credit card, and an ISP to quickly create private electronic work spaces where members can post messages and publish documents. Even better, the cost for this service is as low as $10 per user per month.

BYE-BYE, MIS

MORE FEATURES ARE on the way, too. Within six months, these virtual private networks will support group scheduling and Web-based surveys. Further out, look for chat rooms and whiteboarding capability.

Why would you want this unorthodox service? Maybe your business can't justify the expense of a network, but you'd like the ability to work on short-term projects with people scattered all over the country. Or you work for a larger enterprise that has its own network, but you can't give accounts to collaborators outside the company—and chasing down your IS manager to make special arrangements will force you to blow your deadline.

> Instant intranets can **eliminate lots** of **couriers,** lots of **faxing,** and lots of **telephone calls,** says Laura Wills of Russell Incorporated.



Laura Wills, creative director at Russell, and Eric Wang, Russell's Intranet designer.

Early users like Laura Wills, creative director at Russell Incorporated, a Toronto-based branding and communications company, have discovered that an instant intranet can pay off. "It eliminates lots of couriers, lots of faxing, and lots of telephone calls," she says.

"We haven't got an intranet yet, and this was a fast and easy way of getting people together online," adds Wills, whose company is helping to develop a corporate intranet for Mutual of Omaha's Canadian subsidiary.

The six-month project involves about 30 people from Russell (which is doing the graphic design), Mutual of Omaha, and another Toronto company that is creating the network infrastructure. All of them are using Changepoint International's Involv Project Collaboration—a Web-based package that works with Microsoft Project—for everything from assigning tasks to submitting final graphic designs.

Although documents could be exchanged by e-mail, Wills notes that posting graphics files online saves bandwidth, and the threaded discussion groups keep everybody informed. "With e-mail, not everyone can see all the responses," she says.

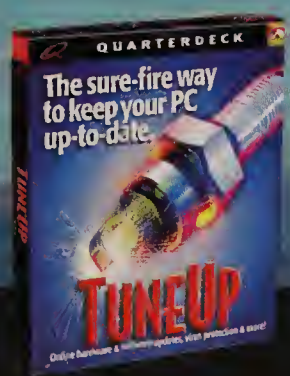
Changepoint was one of the first companies to enter the marketplace with Web-based groupware in January, but it has recently been joined by two competitors. Lotus's Instant Teamroom was introduced this summer, and Netscape Virtual Office by Concentric was launched in September as part of Netscape's Netcenter Web site.

All three services are offered through partnerships between the software companies ▶

PAY-AS-YOU-GO INTRANETS

SERVICES	Monthly cost	Disk space/ traffic limits	Surcharges	Special features	Reader service number
Changepoint Involv Project Collaboration 800/263-7189 www.involv.com	$25 per user	1MB average per user/ none	$10 per month for each additional 1MB of storage	Supports Microsoft Project.	756
Lotus Instant Teamroom 800/343-5414 www.lotus.com	$14.95 per user	none	none	Supports multiple views à la Lotus Notes.	757
Netscape Virtual Office by Concentric 800/233-2384 www.netscape.com	$10 to $29 per user	10MB to 100MB/100MB to 1.5GB per month	$10 per month for each additional 10MB of storage; $24 per month for each additional 300MB of traffic	Supports registration of domain names and public Web site.	758

PHOTOGRAPH: EDWARD GAJDEL



DING DING. PULL INTO TUNEUP™ TO KEEP YOUR SYSTEM UP-TO-DATE AND RUNNING LIKE A CHARM. TUNEUP KEEPS TRACK OF THE LATEST UPDATES ON THE INTERNET AND DOWNLOADS THEM JUST AS SOON AS YOU SAY GO. SIT BACK AS WE GET YOUR SYSTEM INTO CHERRY SHAPE, ALL THE WHILE PROTECTING IT FROM VIRUSES THAT MAY BE LURKING DOWN THE ROAD. AND WITH 24-HOUR-A-DAY ONLINE TECHNICAL REFERENCES, ALL YOU HAVE TO DO IS PULL UP, TUNEUP, AND BE ON YOUR WAY WITH EVERYTHING YOU NEED, INCLUDING A LITTLE WELL-OILED PEACE OF MIND. TUNEUP CAN BE FOUND AT THESE FINE RETAILERS: COMPUSA, COMPUTER CITY, BEST BUY, STAPLES, OFFICE DEPOT, OFFICE MAX, EGGHEAD COMPUTER, FRY'S ELECTRONICS, ELECTRONICS BOUTIQUE, AND BABBAGES. FOR MORE INFORMATION ABOUT HOW TUNEUP CAN GET YOUR SYSTEM READY TO ROLL, CALL 1-800-282-0866 AND MENTION CODE #01160, OR LOG ONTO WWW.TUNEUP.COM FOR A FREE 30-DAY TRIAL.

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SAVE UP TO $40 ON SELECTED QUARTERDECK PRODUCTS LIKE TUNEUP,™ CLEANSWEEP® DELUXE, PROCOMM PLUS® 32, AND QEMM® 97. SEE YOUR LOCAL RETAILER FOR DETAILS.
OFFER EXPIRES 12/31/97.

Circle 190 on reader service card

and one or more Internet service providers, which actually host the work space in much the same way they would host any commercial Web site. Changepoint has partnered with UUNet Technologies for Involv; Lotus's first Teamroom partners are Interliant, Netcom, and US West; and Concentric Network is hosting Netscape Virtual Office.

QUICK START

BUT YOU DON'T need an Internet account with any of these ISPs to set up an electronic work space. Just go to the service's Web site through your own ISP and sign up. The process is quick and not much different from registering for a Web site or making a purchase online.

Although the concepts are similar, services and prices differ (see "Pay-as-You-Go Intranets"). Teamroom will look familiar to users of Lotus Notes; its advantages include unlimited traffic and disk space. Virtual Office sets up a domain name for your work space, gives every team member an e-mail address, and allows the workgroup to publish on the public Internet. The program is reasonably priced, but I found the beta version harder to use than Involv and Teamroom. Logging in to Virtual Office, for example, is cumbersome: Users must type in lengthy e-mail addresses.

Instant intranets should become more exciting as new Web-based groupware begins to arrive, much of it from smaller companies that adapt existing packages to run over the Internet. Recent packages include Emerging Technology Solutions' Decision Survey in a Box, an application for conducting Web-based surveys, and ErgoTech's WebLeader, an e-mail distribution system. And the next time you plan a major event, you may want to look at Web-based applications being developed by Synectic Systems, which created the software used to plan the 1996 Republican convention.

> **The downside:** Smaller workgroups may find regular **e-mail cheaper**—and plenty good enough for **limited use.**

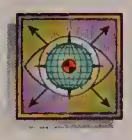
There is, of course, a downside to this end run around your IS department. If you're limited to a dial-up connection, you might not be online when one of your colleagues needs you. Involv and Virtual Office limit the amount of disk space included in the basic monthly rate, so you could get hit with hefty surcharges if you post too many large files. And smaller workgroups may find regular e-mail cheaper—and good enough for limited use.

But for small businesses and consultants that dream of competing with their mega-wired counterparts, the instant intranet may be the quickest, easiest, and cheapest fix you're likely to find.

—*Yardena Arar* ■

WEB BROWSER

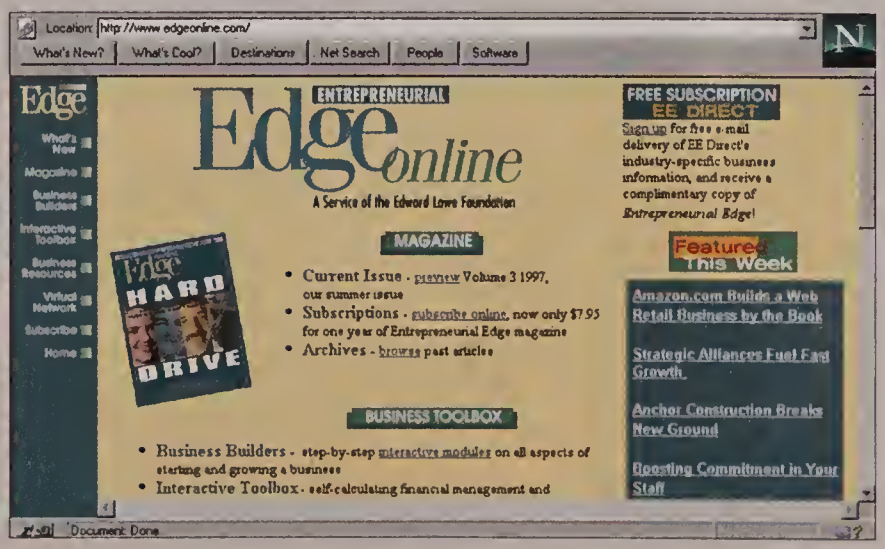
Help for the Novice Entrepreneur



MAYBE YOU HAVE an idea for the next multimillion-dollar product. Then again, maybe you're just tired of working for someone else and want to start your own business. The World Wide Web offers plenty of guidance for anyone thinking of taking the entrepreneurial plunge, and can help you navigate the legal, financial, and personal challenges ahead.

The Edward Lowe Foundation (www.lowe.org) maintains SmallbizNet and Entrepreneurial Edge Online, two Web sites that are linked directly to its home page. SmallbizNet serves as a clearinghouse of information for owners of small businesses. It features the Edward Lowe Digital Library, which has 4000 searchable full-text documents, including a feasibility checklist for starting a small business and a guide to raising capital. Many of the articles are free, but fees are charged to access chapters of books from commercial publishers.

Entrepreneurial Edge Online, a joint venture between the foundation and *Entrepreneurial Edge* magazine, offers articles with practical advice, profiles, and interviews with people who have gone through the process of launching and building a business. The site includes interactive forums and "Business Builders," a series of 42 self-paced training modules that teach all aspects of running and growing a business, from marketing to managing.



STARTING A NEW BUSINESS? Visiting this site should be high on your to-do list.

Another organization tapping the Web to foster new businesses is the Ewing Marion Kauffman Foundation. Its Web site, EntreWorld (www.entreworld.org), has an intelligent engine that helps you search for articles on entrepreneurship on sites around the Internet. When you get a hit, a summary steers you to the most useful sections of the article.

Now take a trip to Arkansas. The University of Central Arkansas in Conway is where you'll find the Small Business Advancement National Center (www.sbaer.uca.edu). There is plenty of useful information here, including articles on how—and why—you should write a business plan.

It's easy to spend a lot of time browsing through these sites. Use them as a tool rather than a distraction, though, because once you start a business you'll learn what "time is money" really means.

—*Daniel S. Levine*

"It's no accident, folks."
GATEWAY2000
"You've got a friend in the business."®

MMX™
intel inside
pentium® II

Born in the Midwest 12 years ago, Gateway long ago rampaged past the suburbs and headed uptown. Now Gateway's huge product line offers customers everywhere one address for all their home and business computing needs.

Skyscraping Loyalty

Once customers experience the Gateway stampede, a lot of them come back again. An IDC/ACNielsen survey of computer owners showed Gateway had the highest brand loyalty of **any** computer maker in the U.S. home market, even higher than those West Coast guys with the fruit logo.*

To make sure we satisfy all our customers, Gateway has developed broad product lines.

"Gateway's loose in the city!"

PCs that Put You in the Passing Lane

Our **E-Series** line rules the corporate high-rise with smart PCs ready for the network and the business muscle of workstations and servers. Our **GP-Series** PCs deliver the same power and value to small business while **Gateway Solo** portable PCs brim with speed, flexibility and modularity and are born to run.

When it comes to group computing the **Destination Digital Media Computer's** 31-inch or 36-inch monitors (35.5-inch viewable) give any home, school or office a great view.

And the Gateway product line that started it all, the **G-Series**, is street-smart and well-connected when it comes to delivering fresh multimedia to your home.

Call Gateway today and see how our big-city selection and convenience mix with down-home quality and value.

Based on percentage of computer owners planning to buy another computer of the same brand as they currently own between 11/1/96 and 7/31/97.

GATEWAY 2000

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800-846-4513

www.gateway.com

HOT IN THE CITY

Just because Gateway's roots are planted firmly in South Dakota doesn't mean we don't appreciate the bright lights and big city crowds. We've got a crowd of 30,000 calling Gateway every day, telling us what they want to do with their PCs.

So we search our new technology sources day and night, choose the brightest lights and deliver them to our customers. Things like **Pentium® II** processors for home *and* office, the wonders of DVD, large monitors, high-performance graphics cards and great speakers. We ask, "How can this benefit our customers?" and then we make it happen.

Take a look at these glittering values and give us a call today.

What's Hot

GATEWAY™ NS-Series Servers

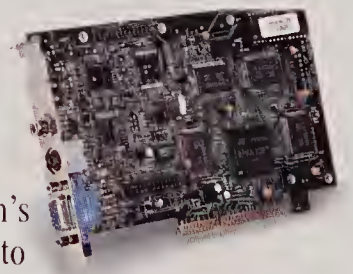
Gateway moves upstairs to the executive suite with three new tower models as durable as New York's mountainous skyscrapers. Our NS-Series servers' fault-tolerant options include error-correcting memory systems, RAID storage and redundant power supplies. An InforManager™ manageability subsystem alerts you if a component needs attention. Gateway servers are the main engines to power your business productivity into overdrive without the 100-story margins traditionally built into servers.

Gateway E-Series Workstations

Gateway's workstations are built for your business's heavy lifting. With **Pentium II** processors running on a high-octane Microsoft® Windows NT® operating system, you're at the controls of a machine that can reign in complex data and execute processor-busting feats faster than you can make lunch plans. And, as with our server line, Gateway brings workstation margins down from the penthouse to the ground floor.

Accelerated Graphics Port (AGP)

Creating amazing graphics on your PC screen used to take a lot of memory on your graphics accelerator card. AGP, the next-generation graphics system developed by Intel, transfers some video memory functions to the system's memory. That lets your video card widen the flow of data to the monitor, creating smooth, fast video and sophisticated 3-D performance. It's like adding four lanes to your video data highway for the price it takes to paint the center line.



Destination™ Digital Media Computer

In April 1996, the Gateway Destination Big Screen PC/TV pioneered the PC category that merges television and computer technology. Now the bright light in the convergence category gets brighter with the second-generation Destination Digital Media Computer. The system comes with an even bigger screen — an enormous 36-inch monitor (35.5-inch viewable). The pristine digital picture of DVD on a huge digital monitor: Video nirvana.

DVD (Digital Versatile Disc)

The new star shooting up the PC charts is called DVD, initials destined to be as recognizable as "LA" very soon. Start with its amazing capacity: seven times as much as a CD and room enough for up to 133 minutes of video. And comparing analog video tape to DVD video is like comparing Broadway theater to a 3 a.m. infomercial. Add in the fact that DVD-ROM drives can play most of your existing software and audio CDs and a future superstar is born.

MMX™ intel inside pentium® II PROCESSOR

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HIGH RISE VALUE

Gateway can meet all the needs of your enterprise with servers, desktop systems and workstations. We custom build and configure systems to meet each customers' unique requirements and sink total cost of ownership into the subway.

E-Series Desktops and Workstations

From our low-cost, network-ready E-1000 desktop to our powerful **Pentium® II** processor workstation, GATEWAY™ E-Series desktop options can boost your business.

E-Series desktop features include Desktop Management Interface (DMI)-Compliant PCs with Intel LANDesk Client Manager, easy open cases and a dedicated team of sales and technical support pros standing by to meet your needs.

Our workstations deliver the business muscle you need, using the **Pentium II** processor and Accelerated Graphics Port (AGP) for graphics-intensive applications. Just tell us what you need and we'll get out of our chairs and make it happen.

NS-Series Servers

With three models to handle your workgroup, department or entire enterprise, our server product line feels right at home inside Chicago's lake-front skyscrapers. Our NS-Series servers' fault-tolerant features include optional redundant power supplies, serviceability features and error-correcting memory to help safeguard your data.

Besides all the redundant critical components, the InforManager manageability subsystem uses 30 integrated sensors to monitor temperature, voltage, fan, power supplies and software to let you know if anything needs attention.

Give your Gateway Major Accounts representative a call and let us take your business to the top floor.

Gateway E-3100 PC

Gateway E-3000 PC

Gateway E-1000 PC with optional monitor

Gateway E-Series PCs

- Intel Pentium® with MMX™ Technology or **Pentium® II** Processors
- High-Performance SCSI, EIDE or Ultra ATA Hard Drives
- 2-D or 2-D/3-D Video Adapters
- Pre-installed High-Bandwidth Network Options
- E-Series Low Profile, Desktop or Mid-Tower Case
- Pre-loaded with Microsoft® Windows® 95 or Windows NT® Workstation 4.0
- Hardware Management Features
- Desktop Management Interface (DMI) 1.1 Compliant
- Gateway Gold™ Service and Support for E-Series PCs••

Prices starting at **$979** *(Quantity 1)*

Gateway NS-Series Servers

- Intel Pentium® Pro or **Pentium II** Processors
- A Full Range of Solutions with up to 6-Way Processor Support
- Pre-installed High-Bandwidth Network Options
- InforManager™ Subsystem for Server Management
- Variety of High-Performance Storage Solutions Including Hot-Swappable Internal RAID on some models

Prices starting at **$2499**

Gateway Workstation E-5000

- Intel® 266MHz **Pentium II** Processor with 512K Cache
- 64MB SDRAM
- ▸ **EV900 .26 Screen Pitch 19" Monitor (18" viewable)**
- AccelGraphics Permedia™ 2 AGP with 8MB SGRAM
- 4GB SCSI Hard Drive
- 12X SCSI CD-ROM & 3.5" Diskette Drives
- 3Com® PCI 10/100 Ethernet Adapter
- MS® Windows NT Workstation 4.0
- Intel LANDesk® Client Manager 3.01

$3599 Business Lease: $132/mo.

▸ Intel 300MHz Pentium II Processor with 512K Cache, 128MB SDRAM, 9GB Hard Drive

$5199 Business Lease: $186/mo.

••E-Series PCs are covered by a three-year limited warranty. Length and type of service vary by product. Call or write for details and a free copy of our limited warranty.

Gateway Extras

(Available only with system purchase.)

- 16-Bit Token Ring Adapter **$109**
  3Com PCI 10/100 TP Adapter **$14**
  (both upgrades from ISA TPO 10BASE-T Adapter)
- MS Windows NT Workstation 4.0 Upgrade **$99**
  (upgrade from PCs that include MS Windows 95)
- 9GB SCSI Hard Drive with 10,000 RPM *(Call for upgrade pricing.)*
- 19" Hitachi® Workstation Monitor *(18" viewable)* **$899**
- 21" Hitachi Workstation Monitor *(20" viewable)* **$1199**
  (Hitachi monitor case color differs slightly from Gateway workstation case.)

Please call for current pricing on RAM and other upgrades.

MMX™ intel inside pentium® II PROCESSOR

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E-Series PCs For Business

STAY MOBILE

The Gateway Solo portable PC line is ready for the tray table, taxi, den, kitchen, field or conference room — wherever your road leads.

Speed Limit? What Speed Limit?

Gateway grabbed a cab, cut through processor rush-hour traffic and mountain biked over some suburban obstacles to do the deal: 200MHz and 233MHz Intel Pentium® processors with MMX™ Technology for our mobile customers. All at prices that *may* make you wonder if the whole deal is legit.

Uptown Options

Our flagship Gateway Solo 9100 portable was built with one word in mind: features. The result is a portable that can take care of business as well as your desktop system and still come along on road trips. Common docking stations for all our Gateway Solo portable PCs let you turn any portable into a desktop.

Looking for a classic portable with high quality at a low price? Check out the Gateway Solo 2300 portable. It's a lot of computer for not a lot of money and perfect for the budget conscious or as a compliment to a desktop PC.

Under Construction

No pre-built portables here. Gateway builds every mobile and desktop PC fresh, only after a customer orders it. And, thanks to common modularity, your IS department can buy a supply of components that work in both the 2300 and 9100.

When it comes to fresh technology, common modularity and choices, Gateway is as refreshing as an open road with a tail wind.

Gateway Solo™ Portable PCs

2300SE

- 12.1" SVGA DSTN Color Display
- Intel® 133MHz Pentium® Processor
- 16MB SDRAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- 128-Bit Graphics Accelerator w/ 64K Colors
- Modular 6X min/11X max CD-ROM Drive
- Modular 3.5" Diskette Drive
- USB Ports & Zoomed Video
- NTSC/PAL Video Output
- 2GB Hard Drive
- 16-Bit Sound & Stereo Speakers
- NiMH Battery & AC Pack
- 85-Key MS® Windows® 95 Keyboard
- EZ Pad® Pointing Device
- Casual Carrying Case
- Microsoft® Windows 95
- MS Works 95
- Gateway Gold™ Service & Support for Portable PCs

$1999 As low as* $70/mo.

2300LS

- 12.1" SVGA TFT Color Display
- Intel 200MHz Pentium® Processor with MMX™ Technology
- 32MB SDRAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- 128-Bit Graphics Accelerator w/ 64K Colors
- Modular 6X min/11X max CD-ROM Drive
- Modular 3.5" Diskette Drive
- USB Ports & Zoomed Video
- NTSC/PAL Video Output
- 3GB Hard Drive
- 16-Bit Wavetable Sound & Stereo Speakers
- PC Card 33.6 Data/14.4 Fax Modem**
- 12-Cell Lithium-Ion Battery & AC Pack
- 85-Key MS Windows 95 Keyboard
- EZ Pad Pointing Device
- Casual Carrying Case
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta® 97
- Gateway Gold Service & Support for Portable PCs

$3849 As low as* $134/mo.

9100XL BEST BUY

- **13.3" (1024 x 768 resolution) XGA Color Display**
- Intel 233MHz Pentium Processor w/ MMX Technology via Intel's Mobile Module (I.M.M.) Package
- 64MB SDRAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- **4MB EDO Video RAM (1280 x 1024 external)**
- **Removable Combo 6X min/11X max CD-ROM & 3.5" Diskette Drive (allows for second battery pack)**
- USB Ports & Zoomed Video
- NTSC/PAL Video Input & Output
- 5GB Hard Drive
- 16-Bit Wavetable Sound & Yamaha Stereo Speakers
- PC Card Modem with x2 Technology**
- Two 12-Cell Lithium Ion Batteries & AC Pack
- External Battery Charger
- Full 88-Key MS Windows 95 Keyboard
- EZ Pad Pointing Device
- 15-Pin MIDI/Game Port
- Executive Carrying Case
- Gateway Solo Mini Docking Station
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for Portable PCs

9100XL $5699 As low as* $198/mo.

9100SE *(Intel 150MHz Pentium processor with MMX Technology, 2GB Hard Drive, 16MB SDRAM, MS Works 95, One Lithium Ion Battery, and Casual Case. Excludes Docking Station, External Battery Charger and Modem.)* **$3299** As low as* $115/mo.

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a system.)

- Gateway Solo Docking Station **$599**

- Gateway Solo Mini Docking Station **$199**
- Additional 2300/9100 Lithium Ion Battery **$200** *(with system purchase)*
- Canon® BJC®-80 Color Bubble Jet Printer **$299**
- Auto/Airline Adapter **$99**

Please call for current pricing on RAM and other upgrades.

MMX™ intel inside pentium® PROCESSOR

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Gateway Solo Portable PCs For The Road

ALL ROADS MERGE AT THE BIG SCREEN

Embrace the digital future of entertainment and information with the Destination Digital Media Computer. This second-generation Big Screen PC/TV converges digital technologies into one system that leaves your traditional home entertainment system in the dust.

The Big Gets Bigger

Take your pick between 31-inch and 36-inch (35.5-inch viewable) SVGA color monitors. Digitally enhanced television performance provides dazzling broadcast images. Keep the Destination DMC traffic flow under control with the cordless keyboard and Field Mouse remote that make this system perfect for the classroom, family room and every room in between.

DVD On-ramp

Digital Versatile Disc (DVD) is here! With technology that can hold up to 133 minutes of crystal-clear video on one disc, DVD is the heir apparent to CD-ROM and maybe even VCR tape. The Destination DMC's huge monitor is the perfect playground for showing the growing number of major motion pictures now available on DVD. To help make it all come alive, we offer the Apocalypse 3Dx high-end graphics accelerator worthy of DVD's pristine signal.

Call us today to see how you can combine a DVD-ROM drive, **Pentium® II** processor and Apocalypse 3Dx graphics accelerator for your own eight-lane digital entertainment highway.

Gateway Destination D6-30
Digital Media Computer wit
harman/kardan speakers

GATEWAY™ Destination™ Big Screen PC/TVs

D5-166

- Intel® 166MHz Pentium® Processor with MMX™ Technology
- 32MB SDRAM
- 512K Pipelined Burst Cache
- Destination 31" SVGA Monitor
- 2MB Graphics Accelerator w/ Cable-Ready TV Tuner
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq® Wavetable Audio
- **Boston Acoustics® MicroMedia™ Speakers**
- TelePath® Modem *for Windows* with x2™ Technology
- 7-Bay Charcoal-Colored PC Case
- Cordless Keyboard w/ Integrated EZ Pad® Pointing Device
- Cordless Field Mouse® Remote
- Microsoft® Windows® 95
- Home Software Titles
- Gateway Gold™ Service & Support◆ for Big Screen PC/TVs

D5-166 $2499 As low as× $87/mo.

D5-200 BEST BUY *(Intel 200MHz Pentium Processor with MMX Technology, 4GB Hard Drive, DVD-ROM Drive and DVD Decoder Card)*

$2999 As low as× $104/mo.

D6-233

- Intel 233MHz **Pentium® II** Processor with 512K Cache
- 64MB EDO DRAM
- Destination 31" SVGA Monitor
- 2MB Graphics Accelerator with Cable-Ready TV Tuner
- 4GB 11ms EIDE Hard Drive
- **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- **harman/kardon® High-Fidelity Sound System**
- TelePath Modem *for Windows* with x2 Technology
- 7-Bay Charcoal-Colored PC Case
- Cordless Keyboard w/ Integrated EZ Pad Pointing Device
- Cordless Field Mouse Remote
- MS® Windows 95
- Home Software Titles
- Gateway Gold Service & Support◆ for Big Screen PC/TVs

$3999 As low as× $139/mo.

◆*The Destination 31-inch and 36-inch monitors are covered by a one-year limited warranty. Call or write for a free copy.*

Gateway Destination DMC

D6-300XL

- Intel 300MHz **Pentium II** Processor with 512K Cache
- 64MB EDO DRAM
- Destination 36" SVGA Monitor (35.5" viewable)
- 4MB Apocalypse™ 3Dx Graphics Accelerator
- 2MB Graphics Accelerator with Cable-Ready TV Tuner
- 8.4GB 8.5ms EIDE Hard Drive
- **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- **harman/kardon High-Fidelity Sound System**
- TelePath Modem *for Windows* with x2 Technology
- 7-Bay New-Look Charcoal-Colored PC Case
- Cordless Keyboard w/ Integrated EZ Pad Pointing Device
- Cordless Field Mouse Remote
- MS Windows 95
- Home Software Titles
- Gateway Gold Service & Support◆ for Digital Media Computers

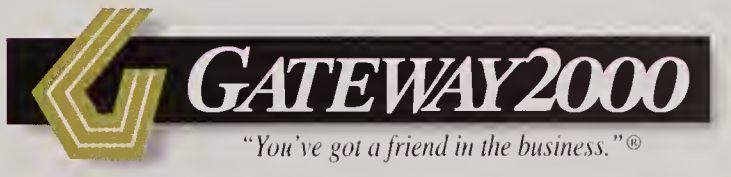
$4999 As low as× $174/mo.

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a system.)

- Additional Destination 31-inch SVGA Color Monitor **$849** *(call for details)*
- EasyPhoto Drive™ Photo Scanner **$129** *(with system purchase)*
- Epson® Stylus® COLOR 600 Ink Jet Printer **$299**
- Epson PhotoPC™ 500 Digital Camera **$399**

Please call for current pricing on RAM and other upgrades.



800-846-4513

www.gateway.com

Destination Big Screen PC/TVs For Group Computing

HANDLING YOUR TRAFFIC

Looking for a computer that has the brute power, fresh technology and versatility you need to handle small business traffic? How about network options? The GP-Series PCs can deliver order to data chaos at prices that won't cause a budget detour.

Fresh Technology for the Digital Jungle

Here's some power: **Pentium® II** processor-based system including an 8MB graphics accelerator optimized for Windows NT. This one system can juggle massive data chunks and handle your complex graphics applications like computer-assisted design and architecture without breaking a 3-D sweat. Among your options is a dual **Pentium II** processor-ready system. Add the second processor right away or upgrade later as your business computing needs grow.

Our customers let us know that they wanted easy-access cases for small and medium business and we listened. The GP-Series desktop and mid-tower cases have sliding panels secured by thumbscrews. No tools required. All the GP-Series PCs' open external drive bays are industry standard sizes.

Cut Through Data Gridlock

From muscle machines to low-cost desktops perfect for your small network, the GP-Series has the technology to get it done. Just tell us where you want to go and we'll plot the course, lay out your component options and help you make the choices.

We build GATEWAY™ PCs one at a time, and only after customers have ordered them. Call us today and let our combination of great technology, amazing value and custom configurations help get you where you're going.

Gateway GP-Series professional systems offered in your choice of mid-tower and desktop models

Gateway GP-Series PCs for the Office Professional

GP5-166

- Intel® 166MHz Pentium® Processor with MMX™ Technology
- 32MB SDRAM
- 512K Pipelined Burst Cache
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- 2MB 3-D 64-Bit PCI Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Desktop Case
- 104+ Keyboard & MS® IntelliMouse™
- Microsoft® Windows® 95 & MS Office 97, Small Business Edition plus Encarta® 97
- Gateway Gold™ Service & Support for GP-Series PCs

$1399 Business Lease $52/mo.

GP5-200

- Intel 200MHz Pentium Processor with MMX Technology
- 32MB SDRAM
- 512K Pipelined Burst Cache
- CrystalScan®700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 2MB 3-D 64-Bit PCI Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Desktop Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for GP-Series PCs

$1749 Business Lease $64/mo.

GP6-233

- Intel 233MHz **Pentium® II** Processor with 512K Cache
- 64MB SDRAM
- CrystalScan700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- **nVidia™ 4MB 3-D AGP Graphics**
- 4GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for GP-Series PCs

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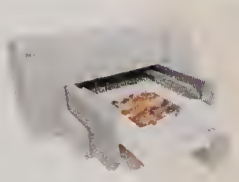

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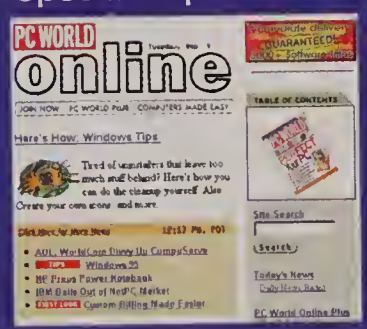

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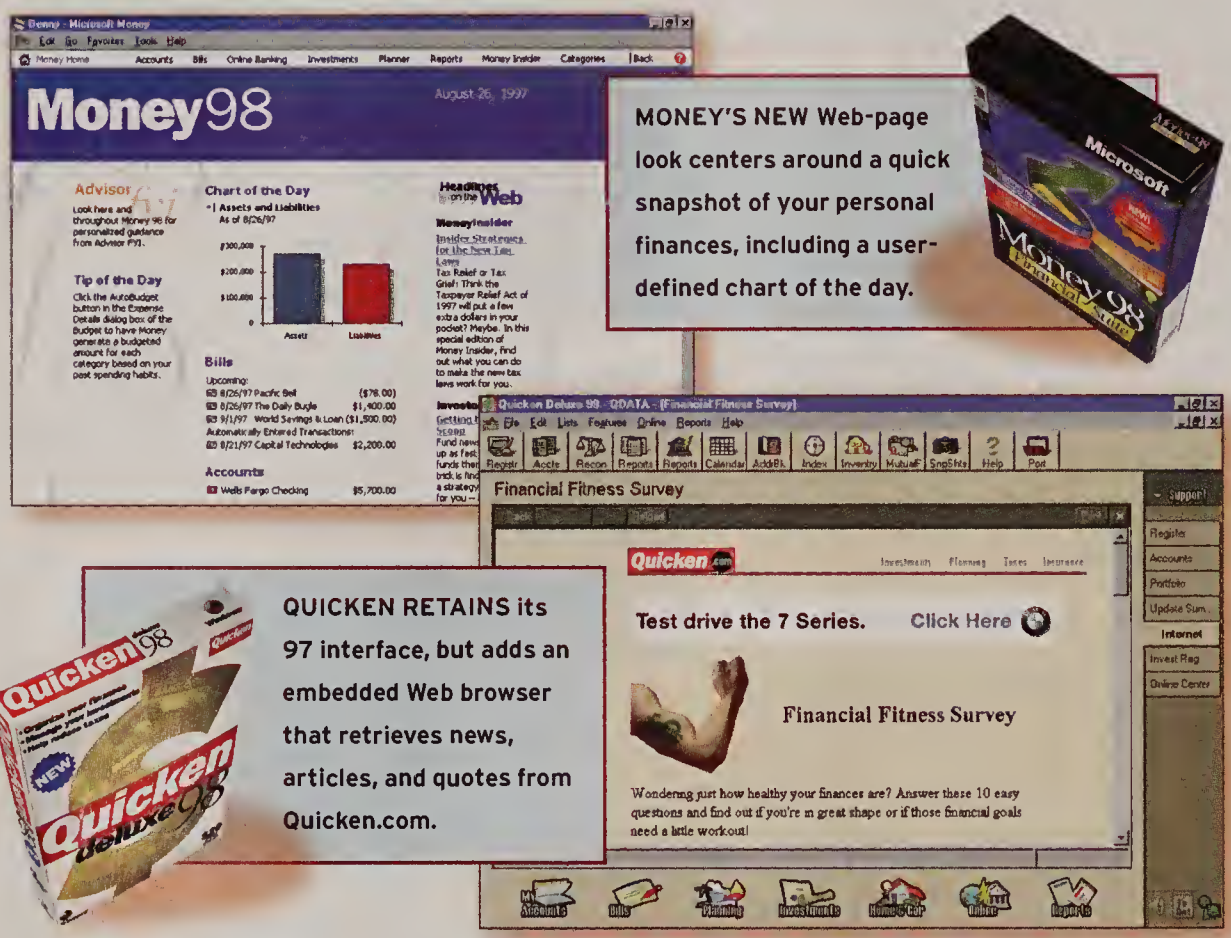
NEW PRODUCTS

Personal Finance 98: Money Versus Quicken



MONEY'S NEW Web-page look centers around a quick snapshot of your personal finances, including a user-defined chart of the day.

QUICKEN RETAINS its 97 interface, but adds an embedded Web browser that retrieves news, articles, and quotes from Quicken.com.

PERSONAL FINANCE

HAVING MORE or less maxed out on basic bookkeeping features, Microsoft Money and Intuit's Quicken now want to help you put and keep your financial house in order. New versions of the two leading personal finance packages not only make paying bills and tracking investments easier than ever, but they also link to Web-based buying guides and financial articles. Money has undergone a total face-lift based on its new capabilities.

Which package is better? For most people, the choice boils down to interface style and a few features. I looked at preproduction versions of **Money 98 Financial Suite** and **Quicken Deluxe 98.** Money Financial Suite offers some excellent personalized guidance, but if you want a folksier interface that isn't as wedded to the Web, you may prefer Quicken.

SHOW ME THE MONEY

MONEY 98 dispenses with the warm, marbled-brown background and brightly colored icons that lent a friendly bank-lobby look to the previous versions. The new opening screen looks like a no-nonsense Web page—no pictures, just text in basic blue and black. This Web look continues throughout the program. While I found the old interface more inviting, the new one is undeniably functional.

Money 98's opening screen gets straight down to business with a quick summary of account balances and upcoming bills plus a chart of the day (all customizable). In the basic $30 version, you also get a tip of the day, and you can download articles and tips from the Money home page by simply clicking a button.

Money 98 Financial Suite, which at $55 costs nearly twice as much as the basic version, offers more customization and content. The opening screen augments the Money home page content with headlines from Microsoft's Insider and Investor financial Web sites and links to articles from other news sources, including the Wall Street Journal, USA Today, and SmartMoney sites.

Financial Suite's opening screen also includes Advisor FYI, which dispenses suggestions, reminders, and observations based on your financial data. (For example, it recommended adding an emergency allowance to my budget.)

In addition, Money 98 Financial Suite alerts you to news about your investments, and its Goal Planner helps you create budgets, plan for special events, and formulate debt-reduction plans. It's similar to Quicken Deluxe's Planner but covers a greater number of specific events. And its automatically generated monthly report is a great tool for really keeping track of your finances.

THE NEW QUICKEN

QUICKEN 98, while sticking basically to the handsome interface of recent versions,

cozies up to the Web with an embedded browser that links on demand to Intuit's Quicken .com site. There you can download mortgage and insurance quotes (but only from companies that partner with Quicken). Other improvements include support for longer category names and a paycheck setup feature that helps you keep track of all those pesky deductions.

Quicken 98 comes in four flavors. For $40, Quicken Basic 98 handles simple checking, online banking, budgeting, and investment tracking. The $60 Quicken Deluxe 98 includes a new emergency-record organizer and 401(k) module, an expanded financial reminder and alert list, and extra Web content. For $90, Quicken Home & Business 98 adds invoicing and expense tracking—handy features for freelancers who don't need heavy-duty accounting capabilities. Quicken Financial Suite 98, also $90, bundles Quicken Deluxe, Quicken Financial Planner 3.0 (for more complex planning), and the new Quicken Family Lawyer Deluxe.

You can't go far wrong with any of these fine packages.

—*Yardena Arar*

Money 98 and Money 98 Financial Suite

PRO: Excellent Web integration, lots of educational content.

CON: Austere interface, must go online to get full value.

VALUE: Full-featured package targets frequent Internet users.

Microsoft
800/426-9400
www.microsoft.com
Street price: Money 98, $30 ($10 upgrade rebate through 11/30); Money 98 Financial Suite, $55 ($15 upgrade rebate through 11/30)

READER SERVICE NO. 730

Quicken Basic 98, Quicken Deluxe 98, Quicken Home & Business 98, Quicken Financial Suite 98

PRO: Friendly interface, embedded browser.

CON: Insurance, mortgage quotes only from Intuit partners.

VALUE: Market leader has a package for almost everybody.

Intuit
800/446-8848
www.intuit.com
Street price: $40 to $90 ($10 to $20 upgrade rebates)

Dell's Inspired PMMX-233 Notebook

NOTEBOOK

DELL'S NEW **Inspiron 3000 M233XT** is fast—*really* fast—and is a good deal. Based on Intel's new Pentium MMX-233 mobile processor, it performs on a par with Gateway 2000's Solo 9100 Pentium MMX-233, the fastest notebook we've seen and is faster than several other PMMX-233 desktops. At $3999, it's not overpriced for a packed portable.

I looked at a preproduction version. Like competing notebooks (see *Top of the News*, October), the Inspiron came with 32MB of RAM, 512K of secondary cache, and a 2.1GB hard drive. You also get a Universal Serial Bus port and a 20X (maximum speed) removable CD-ROM drive. Performance is further enhanced by a desktoplike graphics system that uses a NeoMagic 128-bit video controller with 2MB of embedded memory. (NeoMagic claims this makes programs run faster and batteries last longer.) Our test unit ran for nearly 3.5 hours—decent for a notebook with this kind of power—and the shipping version should perform even better.

THE $3999 INSPIRON is one of the fastest PMMX notebooks we've seen.

Despite the generous 13.3-inch active-matrix display, the Inspiron measures 9.2 by 11.9 inches, so it fits easily into your luggage. It weighs a moderate 8.4 pounds (including CD-ROM and floppy drives plus AC adapter). The standard 1024 by 768 resolution lets you see lots of information at once, but we recommend using the *Large Fonts* display option.

The Inspiron's keyboard is roomy and comfortable, but the touchpad pointing device takes a while to get the hang of. The software bundle includes Microsoft Office 97 Small Business Edition.

—*Brad Grimes* ▶

EDITED BY
Yardena Arar and Laurianne McLaughlin

Dell Inspiron 3000 M233XT

PRO: Superfast, with large screen and good software.

CON: Touchpad is hard to master.

VALUE: A good deal for a truly powerful notebook.

Dell Computer
800/388-8542
www.dell.com
List price: $3999

READER SERVICE NO. 731

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19-Inch Monitors: Room With a So-So View

MONITORS

IF YOU'VE GOT 21-inch-monitor taste but a 17-inch budget, you may find a working compromise in one of the new 19-inch color monitors that are priced under $1000. These recent arrivals provide 18 inches of viewable screen (compared to slightly less than 16 inches on a 17-inch monitor and 19 to 20 inches on a 21-inch unit) for roughly the price of a high-end 17-inch CRT display. And they're a few hundred dollars cheaper than an average 20- or 21-inch monitor. I looked at three: a preproduction version of the $820 **Sampo AlphaScan 810,** and shipping versions of the $849 **Princeton Graphic Systems E090** and the $999 **Compaq V90.**

PRINCETON'S E090: You may find yourself squinting at this monitor's murky display.

All three monitors have a .26mm dot pitch and a maximum resolution of 1600 by 1200. At that resolution, the Compaq can refresh at 85 Hz, compared to the Princeton's and Sampo's 75 Hz—a level that's generally considered the threshold for flicker-free viewing. At a standard resolution of 1280 by 1024, each can refresh at 85 Hz.

For showcasing images such as photographs, Web pages, and other graphics, all three displays were great. But working up close and personal with icons and text was disappointing. The Windows 95 desktop and a Word document with 9-point type (the size of most newspaper text) suffered from a lack of clarity and impact, though less so on the Compaq. A Microsoft Office shortcut bar, for example, looked as inscrutable as a miniature Rosetta stone, and may take almost as long to decode.

Trying to read very small type felt like a punishment with all but the Compaq V90—but that monitor's characters looked slightly smeared, as if they'd been wiped with a damp cloth, and the color also seemed a bit oversaturated. Among the three, the Sampo did the best job rendering natural-looking skin tones and landscapes.

Controls worked fine on all three models. Image stability and uniformity of focus and color all were acceptable (although everything looked a bit duller and muddier on the Princeton).

Both the Compaq and the Princeton adhere to the TCO 95 standard (developed by the Swedish Confederation of Professional Employees), the most stringent benchmark for electromagnetic emissions. The Sampo complies with an earlier but also quite stringent standard, MPR-II.

Should you splurge on one of these spacious monitors? That depends on what you'll use it for. If you spend your days in front of a PC doing intensely detailed work such as creating and editing images or manipulating large, complex documents, these midprice 19-inch monitors just can't deliver the supersharp display that such tasks demand. Your eyes will thank you for buying a top-quality 17-inch model instead, and you may save a hundred dollars or more: The reigning Best Buy among our top 17-inch monitors has a street price of less than $700 (see *Top 10 Monitors,* September).

But if you want a big monitor for presentations, for a permanent display (such as an installation for a museum exhibit), or for browsing the Web or playing games, any of these 19-inch monitors would be more than adequate. I liked the Compaq V90 the best, but if money is tight, the Sampo AlphaScan 810 can do the job.

COMPAQ'S V90: It's a little expensive, but it offers a sharp display and legible small type.

By the time you read this, Optiquest and MAG InnoVision will be shipping similarly priced 19-inch monitors you may wish to check out. Or if you can scrape up a few hundred dollars more, you may want to consider the 19-inch Cornerstone or Hitachi displays in this month's Top 10 Monitors review.

—*Leigh Anne Jones* ▶

Compaq V90

PRO: Sharp display, legible small type, TCO 95 compliant.

CON: Relatively expensive, bleeding text, slightly oversaturated color.

VALUE: Superior display, but costs almost $180 more than the Sampo.

Compaq
800/652-6672
www.compaq.com
Street price: $999

READER SERVICE NO. 732

Princeton Graphic Systems E090

PRO: Good price, TCO 95 compliant.

CON: Muddy display, renders small type poorly.

VALUE: Better options are out there.

Princeton Graphic Systems
800/747-6249
www.prgr.com
Street price: $849

READER SERVICE NO. 733

Sampo AlphaScan 810

PRO: Bargain price, true-to-life color.

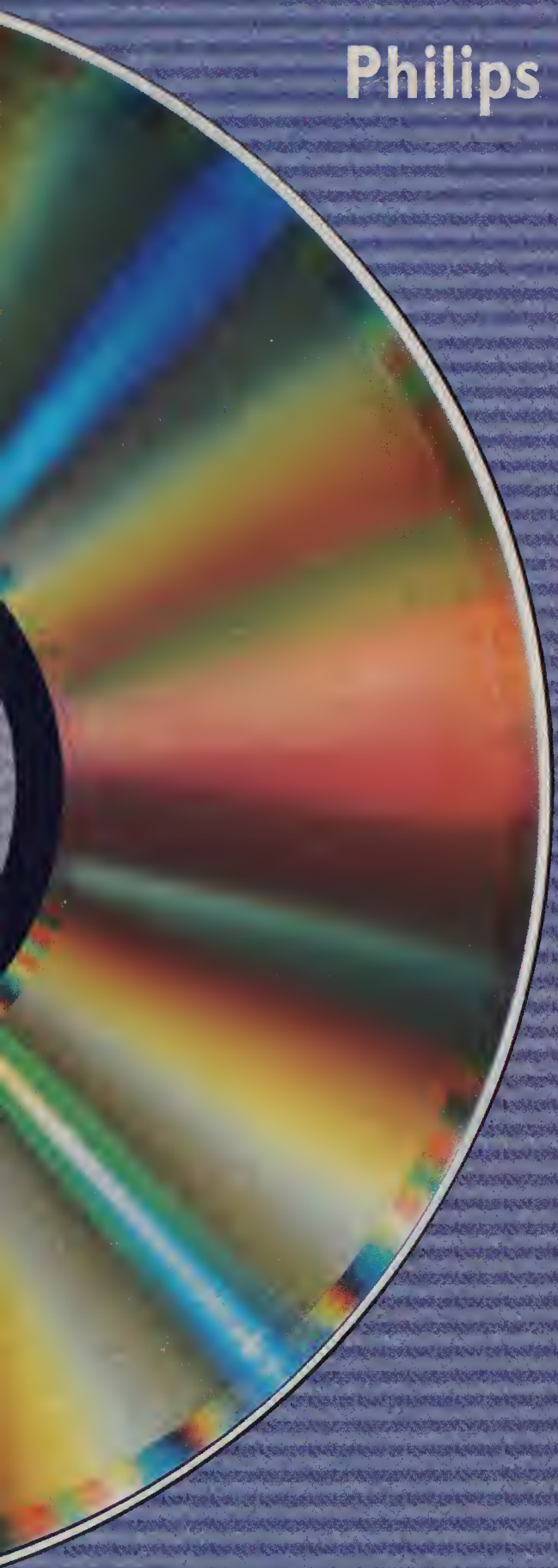
CON: Not great with small type.

VALUE: A good choice for image display.

Sampo Technology
888/321-4100
Street price: $820

READER SERVICE NO. 734

Create a CD on your PC with the Philips CD-ReWritable Drive.



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Circle 45 on reader service card

Xerox, Canon All-in-Ones: Sweeter With Color

ALL-IN-ONES

RAPIDLY FALLING prices for ink jet printers and 8-bit scanners are finally having an impact on that most SOHO of small office/home office products, the multifunction device, or all-in-one. The **Xerox Document WorkCentre 450c** and **Canon's MultiPass C3000** can send and receive faxes, print color documents, scan in grayscale, and make copies—just about everything a solo entrepreneur would need. Unfortunately, neither makes color copies. I looked at shipping versions of both.

Beyond these surface similarities, however, the two devices quickly diverge. The $549 Xerox is a tightly packed and carefully thought out office system, while Canon's $499 unit resembles a printer with a haphazard collection of add-ons.

Software bundled with the WorkCentre 450c includes WinFax Lite, Xerox TextBridge Pro for optical character recognition, and Xerox Pagis Pro for document management. Powerful faxing abilities include polling remote fax machines, forwarding incoming faxes to another number, password-protecting fax mailboxes, and assigning codes to faxes for accounting purposes. The MultiPass C3000, on the other hand, ships with Canon Creative—an attractive but print-oriented design suite—plus the MultiPass document manager for lightweight faxing and Xerox's TextBridge Classic, an old version of what's now called TextBridge Lite.

Xerox also beats Canon on design. The chassis of the WorkCentre I examined is tough, with paper trays that fit snugly inside the case; the MultiPass relies on wobbly wire loops to catch prints and faxed documents. The WorkCentre's control panel is also easier to use than the Multipass's. However, the Canon's straight paper path is less likely to cause jams than the Xerox's tightly curved one.

If printing is your primary need and you can muddle through the occasional fax or copy job, go with the Canon. But if your business relies on every function of an all-in-one, the Xerox is a better choice overall.

—*Dan Littman*

COLOR AND THEN SOME: The Document WorkCentre 450c boasts powerful fax features and first-rate software.

Document WorkCentre 450c

PRO: Powerful fax features, useful document management software.

CON: Mediocre copying.

VALUE: Good choice for the money.

Xerox

800/832-6979

www.xerox.com/products/dwc450c

Street price: $549

READER SERVICE NO. 735

MultiPass C3000

PRO: Strong printing capabilities.

CON: Weak fax features, unfriendly control panel.

VALUE: Not enough muscle to justify the price.

Canon

800/848-4123

www.ccsi.canon.com

Street price: $499

READER SERVICE NO. 736

New HP Ink Jets Print Color Photos for Less

PRINTERS

PRINTERS CAPABLE of cranking out vivid photos generally require costly special paper, and they burn up ink the way a 4X4 consumes gasoline. With the **DeskJet 722C** and **DeskJet 890Cse,** Hewlett-Packard moves toward photo-quality color printing with ordinary inks on ordinary paper.

A redesigned printhead on both models sprays tiny dots of ink for a subtler blend of the basic cyan, magenta, yellow, and black inks. HP claims that this results in more colors, smoother and more lifelike textures, and sharper edges. My tests of a shipping version of the DeskJet 722C indicate that HP isn't just blowing smoke rings (the 890Cse was not ready for testing at press time). On ink jet stock, colors are vivid without being lurid—and are gorgeous on high-quality photo paper (which costs nearly $1 a sheet). Black text has crisp edges and even weight, and both graphics and text look great on plain paper—the toughest challenge for a color ink jet. The 722C is also very quiet.

In *PC World* tests, the $349 DeskJet 722C printed standard monochrome text at 4.1 pages per minute—surprisingly close to Hewlett-Packard's 5-ppm rating.

HP rates the business-oriented, $449 DeskJet 890Cse at 7 ppm for standard black text. HP's $150 JetDirect device allows you to attach the 890Cse to a network.

—*Dan Littman* ▶

DeskJet 722C

PRO: Very attractive print quality, almost noiseless, good software.

CON: None.

VALUE: Worthwhile if you need good-quality photos.

DeskJet 890Cse

PRO: Faster than the DeskJet 722C, can be attached to a network with JetDirect option.

CON: Expensive.

VALUE: Not worth the extra money unless text speed is vital.

Hewlett-Packard

800/752-0900

www.hp.com

Street price: DeskJet 722C $349, DeskJet 890Cse $449

READER SERVICE NO. 737

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Circle 141 on reader service card

DVD-ROM Drives: The Next Generation

DVD-ROM KIT

RELEASED JUST a few short months ago, the first DVD-ROM drives had some limitations: They were slow at reading CD-ROMs, and they could not read CD-Recordable, CD-Rewritable, or some MPEG-1 videodiscs at all. Pacific Digital's **DVD-ROM Upgrade Kit,** the first of the second-generation kits that we've seen, rectifies these inadequacies, and it delivers superb multimedia performance.

The $549 kit consists of a Hitachi IDE DVD-ROM drive that was easily recognized by Windows 95, and a Quadrant MPEG-2 video PCI card that's Plug and Play compliant. The only installation complexities involve audio, which vary depending on whether you want to keep an existing CD-ROM drive and whether you already have a sound card.

The Hitachi's 130-millisecond random access time nearly matches that of topflight CD-ROM drives—a big jump over the 300ms rate of first-generation units—and the 9X–20X CD-ROM and 2X DVD-ROM data transfer rates are twice as fast. The new drive also reads CD-R, CD-RW, and MPEG-1 videodiscs.

Inserting a DVD-ROM data disc—PhoneDisc from Digital Directory Assistance—was a mini-epiphany: instant access to 3.65GB of data on one silver platter! The bundled interactive video title, Silent Steel, is not much of a game, but the audio hints at the promise of DVD. Using the Dolby Pro-Logic Surround Sound and composite video-out plugs on the Quadrant card, I hooked my PC up to my stereo system and TV and watched MPEG-2 movie trailers. The video was crystal clear, the sound comparable to a high-end theater's.

Caveats: The Quadrant card works through the PCI bus with your regular sound and graphics cards, so the monitor's resolution will be only as good as your graphics card allows. Windows 95 is required, and a Pentium-133 or higher PC is recommended.

The Pacific Digital kit faces some competition. Creative Labs has announced a DVD-ROM drive for $379, $170 less than Pacific Digital's product. But Creative says that the new kit's MPEG card won't support the same high resolution as the Quadrant.

On the other hand, Pacific Digital's Upgrade Kit is cheaper than some earlier kits. If you've been waiting for DVD-ROM to come of age, your vigil has ended.

—Jeff Sengstack

Pacific Digital DVD-ROM Upgrade Kit

PRO: DVD-ROM that finally works well and has all the right features.

CON: Pentium-133 needed for optimal performance.

VALUE: Expensive, but worth it if you crave DVD.

Pacific Digital
714/252-1111
www.pacificdigitalcorp.com
Street price: $549

READER SERVICE NO. 738

Olympus D-320L Camera Gets Even Better

DIGITAL CAMERA

IF DIGITAL CAMERAS were made from a gene pool, I'd want some Olympus DNA for my dream device. Olympus's new top-of-the-line **D-320L** digital camera adds several key features to its predecessor, the D-300L, and captures high-quality images at the same 1024 by 768 resolution. Most welcome are the camera's support for removable memory, which allows potentially unlimited storage, and its ability to connect to a TV or VCR for video output. The D-320L is the first high-resolution digital camera to offer both conveniences, which should make it attractive to mobile users like insurance and real estate agents.

The $699 D-320L comes with a 2MB SmartMedia memory card that stores up to 10 pictures at 1024 by 768 resolution, or 30 at 640 by 480. An extra $100 buys a 4MB SmartMedia card that stores twice as many images.

The preproduction model I tested was as easy to use as most other point-and-shoot digital cameras with similar features, including autofocus, autoflash, and a built-in LCD for shot previews and playback. Images had good detail and sharpness and in general compared favorably with images shot with the competing Kodak DC120, which costs $899. However, the Olympus's fixed lens is less versatile than the Kodak's 3X zoom lens. For example, during a zoo visit I was able to get closer shots of animals with the Kodak than with the Olympus.

OPUS OLYMPUS: The D-320L adds removable storage and video output to a top-drawer camera.

The D-320L comes with a serial port cable (for downloading images to a PC), a video-out cable, four AA alkaline batteries, and photo editing software, including Adobe PhotoDeluxe. Not included, however, is an AC adapter, which costs an extra $50. You can make prints directly from the camera with the new $399 Olympus P-300 dye-sublimation printer.

—Richard Jantz ▶

Olympus D-320L

PRO: High resolution, removable memory, video output.

CON: No zoom lens, AC adapter costs extra.

VALUE: Arguably the best-quality digital camera for under $700.

Olympus America
800/347-4027
www.olympus.com
Street price: $699

READER SERVICE NO. 739

Trying to get your head around AGP?

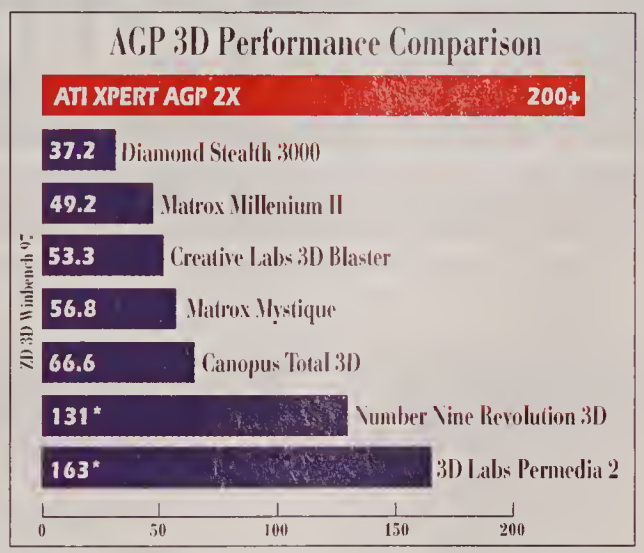
ATI has long been leading the way in 3D chip and board manufacturing - delivering break-through technology to top OEMs including IBM, DELL, SONY, Gateway, ACER and NEC. So, when Intel launched AGP, who else would you expect to be leading the way with fully-implemented AGP solutions except ATI?

ATI delivers all the benefits of AGP right now.

Offering performance up to 4 times faster than other AGP solutions, ATI is the only graphics vendor currently supporting AGP Texturing capability recommended in Intel's AGP specification. ATI's fully-implemented AGP solution achieves higher quality, state-of-the-art 3D graphics, with even richer (hi-res) textures for greater detail, more textures for richer scenes and enhanced performance.

And ATI's XPERT graphic board family, powered by 3D RAGE PRO, also supports the fastest AGP protocol, AGP 2X.

ATI can provide answers and solutions to all your AGP questions. Just as ATI is the leader in PCI, ATI is taking the lead in AGP technology. Being first is second nature to ATI. The first graphics accelerator, the first DirectDraw, and Direct 3D drivers.



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Order Code #591003

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WITH MMX TECHNOLOGY

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- 6.4GB Hard Drive (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- Matrox Millennium II 4MB WRAM PCI Video Card
- Sound Blaster 16 WaveSynth Wavetable Sound
- Altec Lansing ACS-90 Speakers

★ *Upgrade to an 8.4GB Hard Drive with 512KB Cache, add $89.*

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$2999

Personal Lease: $134/Mo., 24 Mos.[◊Σ]
Order Code #501003

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FEATURING MMX TECHNOLOGY

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- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB Velocity 4MB AGP Video Card
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-290 Speakers with Subwoofer

★ *Upgrade to 64MB SDRAM, add $179.*
★ *Upgrade to a Creative Labs AWE64 Value Sound Card, add $39.*

$2499

Personal Lease: $111/Mo., 24 Mos.[◊∞]
Order Code #501002

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WITH MMX TECHNOLOGY

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- 800HS Trinitron Monitor (13.7" v.i.s., .26dp)
- Matrox Millennium II 4MB WRAM PCI Video Card
- Sound Blaster 16 WaveSynth Wavetable Sound
- Altec Lansing ACS-290 Speakers with Subwoofer

★ *Upgrade to a 1000LS Monitor (15.9" v.i.s.), add $99.*
★ *Upgrade to a Matrox Millennium 8MB WRAM PCI Video Card, add $79.*

$1999

Personal Lease: $89/Mo., 24 Mos.[◊π]
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◊Amount of monthly lease payment, based upon 24-month lease from Dell Financial Services L.P., an independent entity; first and last monthly lease payments due prior to delivery: Ø$321; Σ$267; ∞$223; π$178. Above monthly lease payments exclude tax which may vary; (for example, Hartford City, IN sales tax: Ø$8.02); shipping cost and $55 doc. fee due with second payment; no security deposit required, subject to credit approval and availability. Lease terms subject to change.

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Microsoft Internet Explorer

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- 3Com Office Connect Hub 8-Port/TPC
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- 6 Expansion Slots: 3 PCI, 3 EISA

★ *MS Windows NT® Server 4.0 (10 Client Access Licenses), add $799.*

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Business Lease: $177/Mo., 36 Mos.
Order Code #250101

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Dual Processor Capable, RAID Capable

Common features listed above plus:
- 64MB ECC EDO Memory (512MB Max)
- 2GB Ultra-Wide SCSI-3 Hard Drive (27GB Max)
- 24X Max§ Variable SCSI CD-ROM
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- 6 Expansion Slots: 3 PCI, 3 EISA

★ *Upgrade to 266MHz Pentium II Processor, add $300.*
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- 512KB L2 Pipeline Burst Cache
- 128-bit Graphics Accelerator with 64K Colors at 1024x768
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- Cardbus Ready/Fast IR1.1
- 6.9 Pounds*

★ *Upgrade to 64MB SDRAM, add $399.*

$3999‡

Business Lease: $142/Mo., 36 Mos.
Order Code #800186

NEW DELL INSPIRON 3000 M200ST
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Common features listed above plus:
- 12.1" SVGA Active Matrix TFT Display
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- 512KB L2 Pipeline Burst Cache
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- 2.1GB ATA Hard Drive
- Zoom Video and USB Ports
- Stereo Speakers with 3D Surround Sound and Yamaha SW Wavetable
- Cardbus Ready/Fast IR1.1
- 6.4 Pounds*

★ *Upgrade to a 4GB Hard Drive, add $349*

$3399‡

Business Lease: $120/Mo., 36 Mos.
Order Code #800187

NEW DELL INSPIRON 3000 M166ST
166MHz PENTIUM PROCESSOR w/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix TFT Display
- 16MB SDRAM (144MB Max)
- 256KB L2 Pipeline Burst Cache
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- 2.1GB ATA Hard Drive
- Zoom Video and USB Ports
- Stereo Speakers with 3D Surround Sound and Yamaha SW Wavetable
- Cardbus Ready/Fast IR1.1
- 6.4 Pounds*

★ *Upgrade to 32MB SDRAM, add $199.*

$2999‡

Business Lease: $109/Mo., 36 Mos.
Order Code #800183

DELL LATITUDE LM M133ST
133MHz PENTIUM PROCESSOR w/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix TFT Display
- 16MB EDO RAM (72MB Max)
- 256KB L2 Pipeline Burst Cache
- 128-bit Graphics Accelerator with 64K Colors at 800x600
- 1.6GB Hard Drive
- Integrated 16-bit Stereo Sound
- IrDA 1.0 Std. Compliant
- Under 7 Pounds*

★ *Upgrade to 40MB EDO RAM, add $299.*
★ *Upgrade to a 2.1GB Hard Drive, add $149.*
★ *2nd Lithium Ion Battery, add $149.*

$2499‡

Business Lease: $91/Mo., 36 Mos.
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DELL®

ClarisWorks: Still Skinny After All These Years

S U I T E

TOO MANY software suites resemble presidential suites at ritzy hotels—huge, loaded with largely unused amenities, and costly. ClarisWorks has always been lean, useful, and inexpensive. The latest version, ClarisWorks 5.0, is the centerpiece of **ClarisWorks Office**, a $79 package that also includes business templates, Internet connection software, and a limited edition of the Claris Home Page authoring program for the Web. Each of ClarisWorks 5.0's six modules (word processing, drawing, painting, spreadsheet, database, and communications) has been updated with new features that keep the suite competitive. I examined a prerelease version.

Claris has wisely streamlined the user interface: Default Button Bars give quick access to essentials, but you can choose an alternative Button Bar or design your own.

CUSTOMIZABLE INTERFACE: You can easily arrange ClarisWorks 5.0's Button Bars to suit the way you work.

New Web features let you create links to URLs from within applications and save documents in HTML format for posting on a Web site.

ClarisWorks 5.0 can read and write to virtually all popular formats, including Microsoft, Lotus, and Corel office applications—essential for sharing files with others.

More business-oriented than Microsoft Works (and considerably more integrated), ClarisWorks is a logical choice for anyone who wants plenty of power at a budget price.

—Stan Miastkowski

ClarisWorks Office

PRO: Small, fast, inexpensive, and useful.

CON: Not for people who need every suite feature.

VALUE: At less than $15 per office application, a real deal.

Claris Corp.

800/325-2747

www.claris.com

Street price: $79, upgrade $49

READER SERVICE NO. 777

QUICK TAKES

PC-Free Presentations

IN FOCUS HAS come out with a unique accessory for its well-regarded LCD projectors that lets you make presentations without a laptop PC. The LiteShow Pro is a dedicated player that connects directly to a LitePro 720, 220, or 620 projector and automatically launches the show from its built-in 1.2GB hard drive (you transfer the presentation through a supplied parallel port cable) or from an Iomega Zip drive. The internal hard drive comes with Windows 95 and viewer software for running Adobe Acrobat and Microsoft Office 95 and 97 presentations, such as PowerPoint slide shows. You can also use run-time viewers from other presentation programs. But there's a catch: For the $1799 cost of a LiteShow Pro, you could buy a laptop and get double-duty from your investment. Go figure. In Focus; 800/294-6400; www.infocus.com.

READER SERVICE NO. 779

—Richard Jantz

Trellix Makes Business Documents Easy to Read

P U B L I S H I N G

EVER WISH your business reports and documents were as easy to navigate and read as Web pages? They can be with Trellix Corporation's **Trellix 1.0.** This unique $99 Windows 95/NT application combines word processing, page layout, and navigational tools to let you create long, complex business documents for electronic publishing or distribution—a business plan or an employee handbook, for example.

You can browse Trellix files using an included viewer, or save them in HTML format (complete with frames, links, and graphics) for e-mail distribution or posting on the Web.

Trellix's interface makes navigation easy. Below a familiar set of menus and toolbars, a visual map displays all pages in a document and—most commendably—shows you where you are. The selected page, including hyperlinks to other pages, appears at the bottom of the screen. An outline view, with a directory-tree–like display of linked pages, is also available.

I was also impressed with how easy it was to produce Trellix documents. Select a template and master style, and Trellix automatically assembles a working document with sample titles and dummy text. In the preproduction version I reviewed, I could then type in my own content; Trellix says the shipping version will let you import text and other content, resize graphics, and add color to page elements.

The program lacks the built-in drawing tools, alignment features, and snap-to grids that would make it a more powerful design tool. Still, Trellis is a promising package for businesses grappling with long documents.

—Richard Jantz ▶

Trellix 1.0

PRO: Makes complex business documents easier to read on screen, inexpensive.

CON: Lacks drawing, alignment, and grid tools.

VALUE: Useful for publishing on a corporate network.

Trellix Corp.

800/266-0879

www.trellix.com

Street price: $99

READER SERVICE NO. 778

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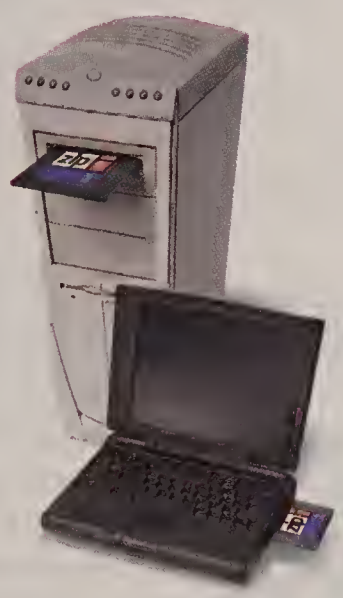

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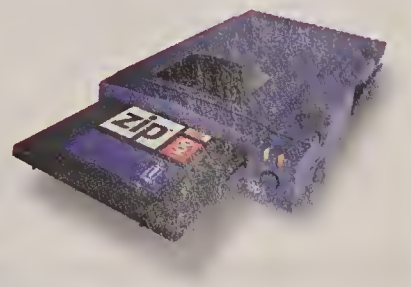

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Project 98 Tackles Complex Planning Issues

PROJECT MANAGEMENT

DILBERT WOULD not like **Microsoft Project 98.** This is project management software for the reengineered, flexible, team-based, project-oriented company of the '90s. If you manage multiple projects and share staff members with other workgroups, you need a program like this one. I found the beta version of Project 98 for Windows 95 and NT thorough and not too hard to learn. The street price is $499 (or $199 for the upgrade).

Project 98 is easier to use than Primavera Systems' $399 SureTrak Project Manager 1.5, and it's less expensive than Scitor's $595 Project Scheduler 7, the other major competitor. For managing your own projects, Kidasa's $179 Milestones Etc. will do. But for juggling many projects and people, you'll appreciate Project 98. It integrates with popular e-mail programs, and it comes with Microsoft Personal Web Server, so you can publish information to a project Web site.

Its key improvements over Project 95 include better scheduling features, better tools for working with project data, and a better interface. For example, you can now note interruptions or split tasks on charts.

Project 98 can exchange information with existing ODBC-compliant databases. A useful Autofilter feature, borrowed from Excel, lets you easily sort project data.

Project 98 looks a lot like an Office 98 application, with similar toolbars and menus, Assistants, and IntelliMouse support. Don't expect to master it in a day, but Project 98 is more accessible than its predecessor. Overall, it's a good revision of a top program.

—Laurianne McLaughlin

Microsoft Project 98

PRO: Flexible, thorough, manages complex projects.

CON: Not worthwhile for an individual user.

VALUE: Excellent for coordinating among several workgroups.

Microsoft

800/426-9400

www.microsoft.com

Street price: $499, upgrade $199

READER SERVICE NO. 780

QUICK TAKES

Everything but the Kitchen Sync

PUMA TECHNOLOGY is known for software that synchronizes personal information managers on desktop PCs, PalmPilots, Windows CE devices, and other handheld units. Now it's addressing the lack of synchronization between one PC and another. IntelliSync 97 for Windows lets you synchronize and transfer data between two desktop or notebook PCs using infrared or cable links. The $69 package ($49 for upgrades) also works with major PIMs—Lotus Organizer, Microsoft Schedule+, Starfish Sidekick, GoldMine, and Day-Timer Organizer. IntelliSync 97 can be set to sync files on two PCs every time they're connected. Puma Technology Inc.; 800/774-7862; www.pumatech.com.

READER SERVICE NO. 782

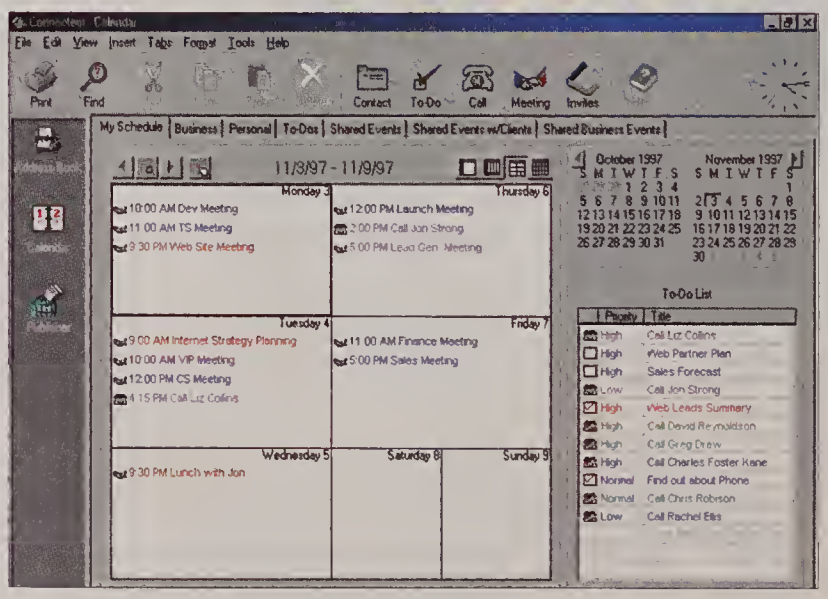
—Michael S. Lasky

Connecteer: A PIM for the Disconnected

PIM

PERSONAL INFORMATION managers are essential for keeping track of people, schedules, and the esoterica we need to survive our days. Now Software's **Connecteer** is a state-of-the-art PIM for desk-bound individuals, networked businesses, and frequent travelers.

What sets Connecteer apart is its focus on portability and information sharing. You can, for example, easily synchronize calendar and address book data between a desktop PC, a notebook, a Macintosh, and a handheld device such as the PalmPilot—either locally through a cable connection or network, or remotely with a dial-up network or remote access package. I had no problems using a preproduction version over a small network.



KEEPING TABS: Connecteer's tabbed interface lets you easily sort and access both personal and shared information.

Connecteer's Phone Link add-on (not ready at press time) will allow data sharing with AT&T PocketNet phones. People in networked workgroups can share information using Connecteer Central, an inexpensive server version that handles group scheduling.

Connecteer lacks the integration with Microsoft applications offered by Office 97's Outlook, but it compensates with extra connectivity and a fast, wizard-based interface. And at $80, Connecteer is very fairly priced.

—Stan Miastkowski

Connecteer

PRO: Well-integrated, easy-to-use, cross-platform PIM.

CON: Nothing major.

VALUE: Good deal for individuals, excellent for workgroups.

Now Software Inc.

800/689-9427

www.nowsoft.com

Street price: $80 (free 60-day trial available); ten-user Connecteer Central $899

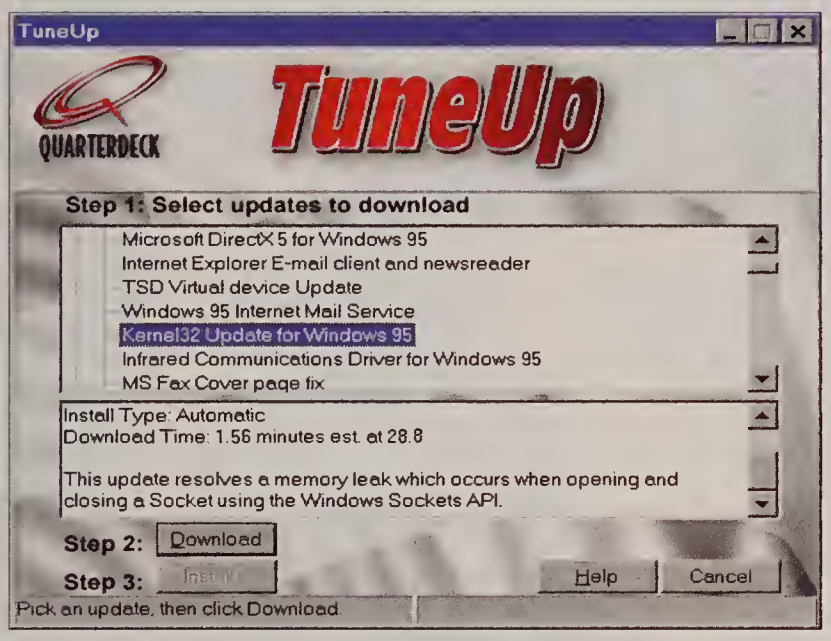
READER SERVICE NO. 781

TuneUp Keeps PCs in Shape

U T I L I T Y

HAVING TROUBLE keeping your software packages and hardware drivers up-to-date? Quarterdeck's **TuneUp** utility does the work for you: It inventories the applications and drivers installed on your PC, then checks various Web sites and gives you a list of possible updates. TuneUp also downloads the ones you choose and helps with installation. CyberMedia's Oil Change does the same job, but TuneUp adds modest virus protection and a year's free access to the very useful TuneUp Web site.

The preproduction version I tested provided a pretty good selection of possible software updates, each with a short and sometimes useful description. (Oil Change gives a bit more detail—typically three or four paragraphs for each program.) TuneUp also lists additional free and shareware programs you might want, but some of them are fairly obscure.



SOFTWARE UPDATES EXPLAINED: Quarterdeck's TuneUp briefly describes possible updates to help you choose what you need.

Unfortunately, downloading more than one program at a time isn't easy. To select multiple updates, you hold down <Ctrl> as you click options—one <Ctrl>-less click deselects everything. Also, TuneUp's bare-bones antivirus tool does not operate in the background.

Buying TuneUp gives you a one-year subscription to tuneup.com, a technical Web site filled with FAQs, bug alerts, and tips on maintaining your PC. Accessing this useful site normally costs $4.95 per month, so the subscription alone makes TuneUp well worth its $30 street price.

—Lincoln Spector ▶

TuneUp

PRO: Easy software updates, subscription to a useful Web site.

CON: Gives some unnecessary shareware recommendations.

VALUE: Worth the price for the Web site subscription alone.

Quarterdeck
800/683-6696
www.quarterdeck.com
Street price: $30 (includes $10 mail-in rebate)

READER SERVICE NO. 784

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Two Smart Mice From Kensington, Logitech

INPUT DEVICE

THE MOUSE YOU got with your PC may work fine, but in PC time it's a dinosaur. The new breed of mice are more intelligent. I looked at shipping versions of two, Kensington's $50 **Internet Mouse** and Logitech's $60 **MouseMan+.**

The Internet Mouse features four programmable buttons that you can use to launch Web sites from a customized menu and scroll effortlessly through sites, documents, and spreadsheets. The AutoScroll feature—activated by pressing two mouse buttons at once—moves the cursor up and down the PC's screen; the farther you move the Internet Mouse, the faster the scrolling speed. The wheel on Microsoft's IntelliMouse can do the same, but only with Internet Explorer and Office 97; Kensington's mouse works with any Windows application. The Internet Mouse is both right- and left-hand friendly, too.

AMBIDEXTROUS: Kensington's Internet Mouse can be used with either hand.

But if Kensington's mouse is smart, Logitech's MouseMan+ is regular Mensa material. Ergonomically designed for righties only, it sports three buttons (two on top and one on the side, for your thumb) as well as a middle scrolling wheel/button, all programmable with the included software. You can set the buttons to do everything from launching applications to duplicating double-clicks or keystrokes, letting you circumvent awkward keyboard–mouse-click combinations.

I found the MouseMan+ easy to use because the programming remained constant through all applications. With the Internet Mouse, by contrast, a mouse-click in Netscape Navigator performs different functions than in, say, Microsoft Word. The mouse is smart, but the user can get confused.

—Michael S. Lasky

THE MOUSEMAN+: Customizable and ergonomic—but just for righties.

Internet Mouse

PRO: Programmable keys and automatic scrolling, ambidextrous.

CON: Button designations vary among applications, causing confusion; no scroll wheel.

VALUE: A good deal if you're left-handed; righties can do better.

Kensington Microware
800/535-4242
www.kensington.com
Street price: $50
READER SERVICE NO. 785

MouseMan+

PRO: Ergonomically shaped for comfort, thumb button, easily customizable, consistent programming.

CON: For righties only.

VALUE: More comfortable and versatile than Microsoft's IntelliMouse.

Logitech
800/732-3039
www.logitech.com
Street price: $60
READER SERVICE NO. 786

Bill Your Time Makes Custom Billing Easy

ACCOUNTING

HOW YOU SPEND your time is important when you bill by the hour. Silver State Software's **Bill Your Time Easily** not only keeps time sheets and creates invoices; it also produces reports that show where your time is going.

I was particularly impressed by the level of detail and customization in the shipping version I examined. Unlike Timeslips, which limits you to 250 billable tasks, Bill Your Time offers unlimited tasks and nesting—that is, tasks based on other tasks. For example, a proposal could consist of meeting with clients, doing research, and organizing information. Another option you won't find in Timeslips is the ability to redesign invoices on a customer-by-customer basis.

Bill Your Time's interface is a bit like Windows 95's Explorer. The left side of the screen displays all document categories (time sheets, reports, client information, forms, and so on) in directory-tree format, with all documents within a highlighted category. Click on a document, and it opens into the window on the right. While it takes some getting used to, this approach lets you open new documents without closing current ones, which can be a big time-saver.

However, I had to consult a manual to find out how to prepare invoices: They're called "reports" and must be created and opened for printing. Also, Bill Your Time can't link directly to popular accounting packages. (Timeslips can do this with an optional add-on.)

Bill Your Time Easily can be used by itself, but the $235 starter package comes with two licenses for an included client version that allows entry of time sheet and expense data. Nicely priced and flexible, it's a good choice for small offices—especially ones with many billable services.

—Ellen DePasquale

Bill Your Time Easily

PRO: Detailed tracking and great flexibility.

CON: No direct link to an accounting program, interface not always intuitive.

VALUE: Good deal if customization is important.

Silver State Software Inc.
888/292-0213
www.silverstate.com
Street price: $235 (includes two client licenses)
READER SERVICE NO. 787

NAV and PC-cillin: Refurbishing the Virus Patrol

ANTIVIRUS

COMPUTER VIRUS writers keep cranking, but utility makers keep rolling out updated countermeasures. Symantec's **Norton AntiVirus 4.0** and Touchstone's **PC-cillin 3.0** offer new tools for detecting and removing viruses, plus handy ease-of-use features.

The major addition to NAV 4.0 is Symantec's Bloodhound technology, designed to identify viruslike activity and new viruses. This so-called heuristic technique works alongside Symantec's standard detection method, and resembles technologies used in Dr Solomon's and IBM antivirus packages.

To update NAV free of charge through the Internet, you can schedule Symantec's LiveUpdate to run automatically at predefined intervals. Or you can receive updates, virus alerts and other information through e-mail by subscribing to NAV LiveMail.

The standard $50 package ($20 less than its predecessor) includes versions for DOS and Windows 3.*x*, 95, and NT. The $70 Deluxe version adds file encryption, protection against ActiveX viruses, and AVI videos about PC viruses.

PC-cillin 3.0 sports a few needed enhancements that make the user interface cleaner. But the biggest change in this $45 package lies under the covers: A new feature called MacroTrap seeks out the Word and Excel macro viruses that account for over 75 percent of virus infections. Touchstone has also improved PC-cillin's ability to scan compressed files and e-mail attachments, and a new plug-in automates and speeds up scanning of Eudora e-mail attachments. Internet updates of virus signature files are free.

While all major antivirus programs do an excellent job, the automatic update feature gives NAV 4.0 the edge.

—*Stan Miastkowski* ▶

Norton AntiVirus 4.0

PRO: Heuristic antivirus technology, automatic updates.

CON: Nothing major.

VALUE: Automatic updates and a reasonable price make it our pick.

Symantec

800/441-7234

www.symantec.com

Street price: $50 to $70

READER SERVICE NO. 788

PC-cillin 3.0

PRO: Improved interface, powerful anti-macro virus abilities.

CON: Updates are not automatic.

VALUE: Least expensive major antivirus package.

Touchstone Software

714/969-7746

www.touchstonesoftware.com

Street price: $45

READER SERVICE NO. 789

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OCR Upgrades: Better and Cheaper

OCR SOFTWARE

MOST SCANNERS come with basic optical character recognition software, but it pays to get industrial-strength OCR if you're converting lots of documents. Upgraded Windows 95 packages from OCR kingpins Caere and Xerox are more accurate and cheaper than their predecessors.

Xerox's **TextBridge Pro 98** is now street-priced at a low $79 (down from $129). Caere's **OmniPage Pro 8.0** costs only $129 for owners of any OCR software; otherwise, the package still goes for $499.

OmniPage Pro features an improved OCR engine and new zoning tools for converting text wrapped around irregularly shaped graphics. It also integrates better with Microsoft Word 95 and 97, and supports multithreading so you can scan one document while editing another.

TextBridge Pro 98 also claims better OCR, and it has enhanced proofreading, table, and zoning tools (although not as versatile as OmniPage Pro's). Following its competitor's lead, TextBridge Pro has added an OCR wizard—helpful for novices.

Both beta versions I reviewed were able to convert a variety of pages. OmniPage Pro performed some tasks better (such as scanning faxes), while TextBridge Pro excelled at others (such as converting tables into spreadsheets).

Overall, I found OmniPage Pro faster and easier to use. It also offers features missing in TextBridge Pro, including multiple views of documents on a screen and the ability to print scanned documents from within the application. But if money is short, TextBridge Pro eventually gets the job done.

—Richard Jantz ▶

OmniPage Pro 8.0

PRO: Accurate text conversion, rich interface, speedy.

CON: Expensive without upgrade.

VALUE: A good investment if you scan a lot of documents.

Caere Corp.

408/395-7000

www.omnipage.com

Street price: $499; $129 upgrade from any OCR product

READER SERVICE NO. 790

TextBridge Pro 98

PRO: Good accuracy, new OCR wizard, low cost.

CON: No multiple views, no print options, limited interface and tools.

VALUE: A good choice for the budget-minded.

Xerox ScanSoft Inc.

800/432-9329

www.textbridge.com

Street price: $79

READER SERVICE NO. 791

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The most complete presentation assembler ever assembled, Medallion is an easy-to-use, fully-interactive program that enables you to create presentations in minutes.

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Circle 49 on reader service card

Robert Schienberg plans hostile takeovers for a living. But at least his monitor is user friendly.

When Robert Schienberg plans a corporate takeover, he has a lot to think about. Profit and loss statements, price/earnings ratios, product potential, and much more.

But the one thing he doesn't have to think about is the monitor he uses to do it all on. The Hansol 700P (15.7" viewable). Its .26mm dot pitch really helps him see clearly. While its quick set-up, drop down control panel with 20 on-screen settings, modern design, reliability, and simplicity of operation, can't help but make his life a little bit easier.

Designed for Microsoft Windows 95

So whether you're planning a takeover or a makeover, downsizing or upgrading, get the monitor that treats you like a friend.

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see us at COMDEX
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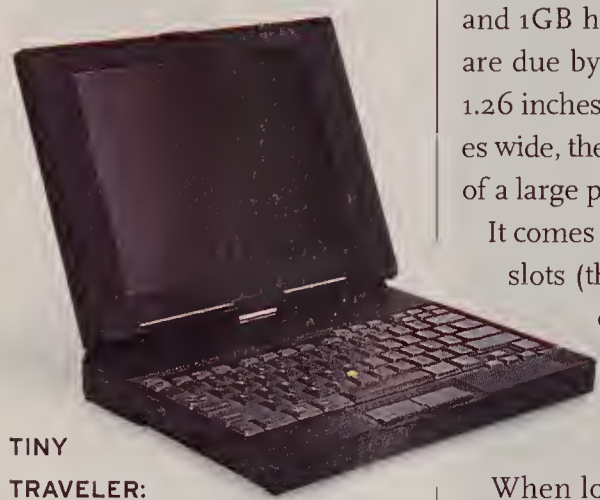
Circle 125 on reader service card

Nimantics' Persona: A Pricey, Petite PC

SUBNOTEBOOK

TOSHIBA'S LIBRETTO, a 1.9-pound subnotebook with a 75-MHz Pentium CPU, meets its first real competitor in Nimantics' 2.2-pound **Persona.**



TINY TRAVELER: Nimantics' Persona weighs only 2.2 pounds but costs $2399.

This $2399 Windows 95 portable has a Pentium-120 CPU, 16MB of RAM (upgradable to 40MB), an 810MB hard drive, and a bright 8.4-inch active-matrix screen. (Pentium-133 and 1GB hard drive upgrades are due by late October.) Just 1.26 inches thick and 9.2 inches wide, the Persona is the size of a large paperback.

It comes with three PC Card slots (the Libretto has just one), 16-bit sound, and stereo speakers placed just below the keyboard.

When loaded with remote access software and a modem (neither of which is included), the preproduction unit I examined was better than a personal digital assistant for routine work on the road.

Unfortunately, a few drawbacks make the Persona less than ideal for heavy-duty office applications. I liked the eraser-head pointing device, but the tiny keyboard proved to be a magnet for typos. Also, the Persona lacks a CD-ROM drive: Unless you buy an external one, you'll have to install software either from the Internet or from the included external floppy drive that connects to a somewhat awkwardly placed socket in the front of the Persona.

For simple word processing, sending e-mail, and using the Web, the Persona is a lightweight dream. But with such a small keyboard, no CD-ROM drive, and the high price tag, you might find yourself dreaming of all the other things you could have bought.

—*Paul Heltzel* ▶

Persona

PRO: Small and very light, better display and features than a PDA.

CON: Tiny keyboard, no CD-ROM drive, expensive.

VALUE: Cute and easy to carry, but not very cost-effective.

Nimantics Inc.
800/646-5005
www.nimantics.com
Street price: $2399

READER SERVICE NO. 792

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North Tower, Suite 500
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Circle 57 on reader service card

THE DIGITAL CAMERA FRONT TO BACK.

Actual dimensions of the D-320L are 5"(w) x 2.6"(h) x 1.8(d). So it easily fits into your pocket.

WAY OUT FRONT

Let's begin with the optics that give Olympus its renown. Here the D-320L exceeds beyond all counts. It has a five element all glass aspherical F2.8 autofocus lens with macro. Quite simply, this lens is equal to the lenses on our award-winning 35mm cameras. Put another way, this digital camera consistently produces higher quality images than other digital cameras, even some with higher resolution.

Also worth mentioning: a four mode flash with red-eye reduction; auto white balancing; and manual exposure controls allowing you to compensate for light conditions.

WE WORK OUR PIXELS HARDER THAN ANYONE ELSE

Our resolution: never produce a high resolution camera without giving the pixels something to do. Our resolution is 1024 x 768 pixels and all 810,000 of them have plenty to keep them occupied. The key is our sophisticated imaging system: the multiple compression ratios that give you a choice of both image quality and size as well as the color management system that rewards you with rich, vibrant images. The result:

every one of our pixels earn their keep.

SHOOT, SHOOT, SHOOT

There are no restrictions on the number of photos you can capture with the D-320L. The 2 megabyte SmartMedia™ card that comes with the camera (4MB optional) has an unlimited capacity. You just simply download the images from the card to your computer by means of the serial cable or the optional PCMCIA or 3.5" floppy disk adapters. Or you can insert a new card anytime and keep on shooting.

Hook up the D-320L to the TV and watch your shots come to life.

NO COMPUTER NECESSARY

For those who don't want to be married to a computer day after day, there's emancipation. The D-320L has video output that directly hooks to your TV. The entire family can now view your shots without the need for a computer. And the images can be videotaped on a VCR and sent to relatives or business associates.

Another direct connection is from the camera to the new Olympus P-300 personal photo printer. In a little over a minute you can print true photo quality images directly from the camera. Finally, digital independence!

OUR REVEALING BACK

It tells you a lot. For one thing, there's the new 2" screen that displays real images in brilliant color. You can use it as a viewfinder or to review your shots one at a time or nine at a time. Or use it to present a slide show by automatically displaying each image one at a time. And if stop action inspires you, the D-320L can capture 9 shots per second in a single frame.

Connect the camera to our photo printer and presto! Get the photo you want, when you want it.

A FEW FINAL BYTES

Note: our more economical D-220L, with a resolution of 640 x 480, is ideal for smaller images (snapshots, the web, electronic presentations) and still gives you all the features and image quality of the D-320L.

Note: last year's Olympus digital cameras won more awards than any other digital cameras. Just imagine what this year will bring.

We've exposed the digital camera front to back. Now you should see for yourself how rich and sharp our images really are. Visit us at www.olympus.com. Or call us at 1-800-622-6372 and we'll answer all your questions.

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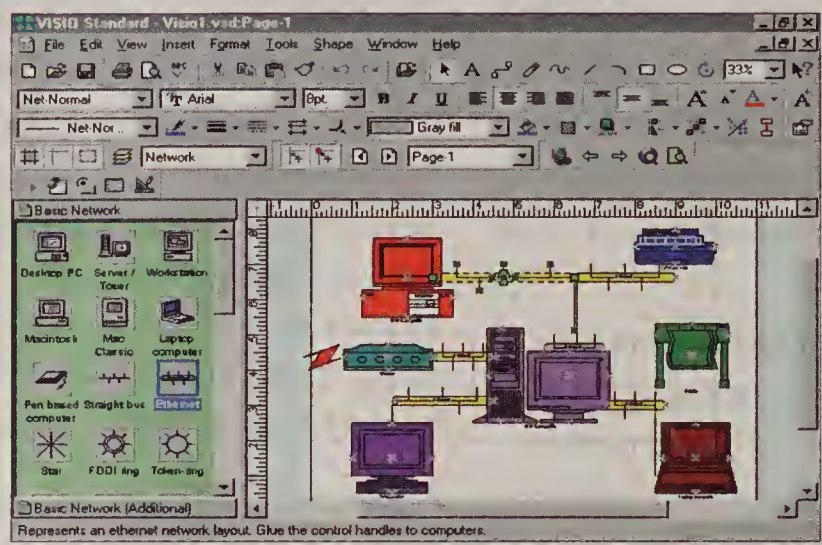
Visio 5.0: Still the Best for Flowcharting

FLOWCHARTS

IF YOU WANT to represent a process graphically, Visio can do it. The fifth and latest release muscles Visio way ahead of its competition. CorelFlow may have better graphics, and Micrografx FlowCharter's collaboration tools and templates may be slightly superior, but Visio's depth, versatility, and excellent documentation make it the overall diagramming leader.



DIAGRAMS GALORE: Visio Standard 5.0 helps you create flowcharts, timelines, forms, and even simple computer networks like this one.

Visio Standard 5.0

PRO: Depth, power, ease of entry.
CON: Steep learning curve to tap full potential; dull graphics.
VALUE: Reasonably priced, leading-edge technology.
Visio Corp.
800/248-4746
www.visio.com
Street price: $149, upgrade $99, Technical or Professional $349
READER SERVICE NO. 793

I examined a preproduction version of **Visio Standard 5.0** (the basic $149 package) for Windows 95 or NT. It helps you create flowcharts, organizational plans, process diagrams, project tracking charts and timelines, form designs, and even office layouts and rudimentary computer networks. Visio's 1300 Smart-Shapes—charting shapes that automatically generate appropriate fields or branches—templates, and design wizards make diagramming manageable. Drag-and-drop features and simple design tools will help newcomers.

The upgrade also improves integration with Microsoft Office. For example, you can now send drawings directly to Exchange folders.

Several new features hail from recent updates to Visio Standard's beefier siblings, Visio Technical 5.0 (for computer-aided design) and Visio Professional 5.0 (for information services development). Charts can be dynamically linked to spreadsheets and databases such as Excel and dBASE: Alter your data, and the chart changes automatically. You can add hyperlinks to charts and save pages in HTML for use on the Web.

A few warnings: Learning Visio's complex features takes serious effort. Also, highlighting graphics is sometimes a headache, and heavy calculations on some charts (notably project timelines) cause 15-second delays when you're simply resizing. Finally, Visio's graphics are a bit dull.

—Jeff Sengstack

FileMaker Pro 4: Nifty Web Publishing Tricks

DATABASE

IN THE unglamorous world of database management programs, Claris's FileMaker Pro has long been pigeonholed as the package for Macintosh users—or people who need Mac and Windows cross-platform capability. The newest version, **FileMaker Pro 4,** changes that. Street-priced at $199, it's the program to own if you need to publish a database to the Web. I reviewed a preproduction version.

It comes with an HTTP server that supports Common Gateway Interface for dynamically delivering pages and queries to any Web browser. Anyone can browse your Filemaker Pro database as long as the program resides on your server and you keep the database open. This unique approach makes FileMaker Pro ideal for intranets. Compared to Microsoft Access, which requires solid programming skills for creating Web applications, FileMaker Pro 4 is astoundingly simple.

The program also lets you export data to an HTML table through its Export menu. You lose formatting (colors, shades, and so on) and end up with a bland table, but you can create a good-looking page and then selectively export records to fill in the blanks.

The Claris Dynamic Markup Language helps make HTML pages more interactive. For example, you could generate a flashing message on given days. This feature is intended for power users, but the rest of the program is easy enough to master. The slide-show style tutorial is comprehensive, though not interactive.

FileMaker Pro 4 looks and feels like its predecessors. It adds several new calculation functions and a much-needed feature for importing Microsoft Excel files. Overall, it's hard to beat FileMaker Pro 4's ease of use and clever Web publishing scheme.

—Yael Li-Ron ▶

FileMaker Pro 4

PRO: Easy to use, well suited for Web publishing.
CON: Tutorial does the job but isn't very interactive.
VALUE: Great choice for publishing a database on an intranet.
Claris Corp.
800/544-8554
www.claris.com
Street price: $199
READER SERVICE NO. 794

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Circle 204 on reader service card

Collier's Encyclopedia 1998: Good Deal for $30

REFERENCE

IF YOU'VE SEEN one CD-ROM encyclopedia, you've seen them all, right? Not quite. Worthwhile encyclopedias from Compton's, Grolier, Microsoft, and World Book all sell for around $80. But **Collier's Encyclopedia 1998,** from longtime game maker Sierra On-Line, is a new choice worth considering. For starters, Sierra offers a $50 rebate through January, bringing the final street price down to an affordable $30.

Collier's does a good job of balancing information with cool (but space-hogging) audio, video, and interactive elements. This three-disc set provides articles that are more in-depth than is typical, while retaining an adequate, though not extraordinary, panoply of multimedia fireworks.

The shipping version I reviewed includes a comprehensive 17 million–word encyclopedia, a Rand McNally atlas, an American Heritage dictionary, and direct links to 3000 hand-picked Web sites for further research. The atlas section works particularly well, with multiple levels of zoom detail (down to street maps), for major cities worldwide. The package is nicely integrated, too: A single search scans the encyclopedia, dictionary, and atlas.

Collier's has 6 million more words than Microsoft Encarta (which comes on two CD-ROMs), and its individual articles are noticeably richer. But because Collier's keeps graphics and other big files on one CD-ROM, you often have to swap discs to view its multimedia elements.

One other small negative: Many CD-ROM encyclopedias let you copy articles into a sequencing folder for batch-printing later; Collier's makes you manually copy and paste to an outside application. This labor-intensive process could eat up valuable time during research projects.

—Glenn McDonald

Collier's Encyclopedia 1998

PRO: Great price, very in-depth articles.

CON: Must swap discs for multimedia elements.

VALUE: A well-integrated alternative to Encarta.

Sierra On-Line Inc.

800/757-7707

www.sierra.com

Street price: $30 (after $50 rebate)

READER SERVICE NO. 795

Hit the Road Again: TripMaker Deluxe 1998

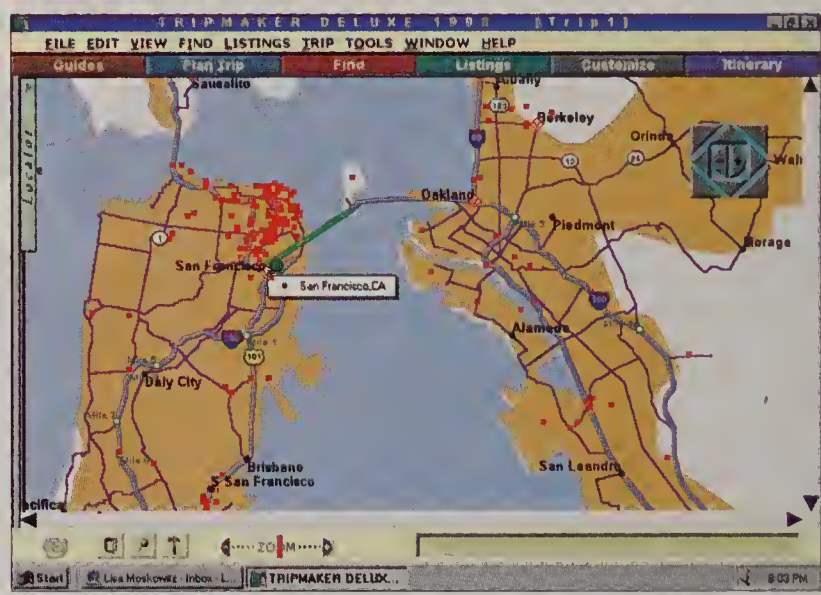
TRAVEL

WITH RAND McNally's **TripMaker Deluxe 1998 Edition,** you not only can map out road trips on major highways, but you can also find that street in Boise, Idaho, where your long-lost college roommate now lives. This CD-ROM is well worth its list price of $44.95 (about $6 more than its chief competitors, Microsoft's Automap Trip Planner and DeLorme's AAA Map 'n' Go).

Besides an extra 250,000 miles of routable roads, the most noticeable difference between this new version and TripMaker 1997 is the streamlined toolbar. The older program had 16 icon buttons—or a dizzying 31 with Reference and Map tools. The new one has 6, with other options relegated to drop-down menus.

To check out a map and itinerary, click Plan Trip and enter your point of origin and destination. As with the previous version, you can personalize your plans by specifying attractions along the way, preferred driving speed, and start and stopping times.

But TripMaker Deluxe's Detailed Settings menu lets you customize further. Search for your favorite fast-food restaurants, then use the new Pitstop feature to schedule rest breaks. Mobil Travel Guide lodging and restaurant listings can be searched by price.



MAPS IN MOMENTS: TripMaker Deluxe 1998 shows the best way to get from city to city, and can pinpoint street addresses, too.

Once you've made it to Boise, it's time to find that old roommate. No problem with the detailed city street maps new to TripMaker Deluxe. You can locate specific addresses, or use the Zoom function to search streets in 82 cities. The program accurately pinpointed a couple of hard-to-find addresses, including my own. Online links point to information about roads and weather as well as travel reservations.

TripMaker Deluxe 98 performed slightly slower than the previous version, but the new features make it well worth the upgrade.

—Lisa Moskowitz ■

TripMaker Deluxe 1998 Edition

PRO: Improved toolbar, new city street maps.

CON: Slightly slower than previous version.

VALUE: Best choice for planning a road trip.

Rand McNally & Co.

800/671-4006

www.randmcnally.com

List price: $44.95

READER SERVICE NO. 796

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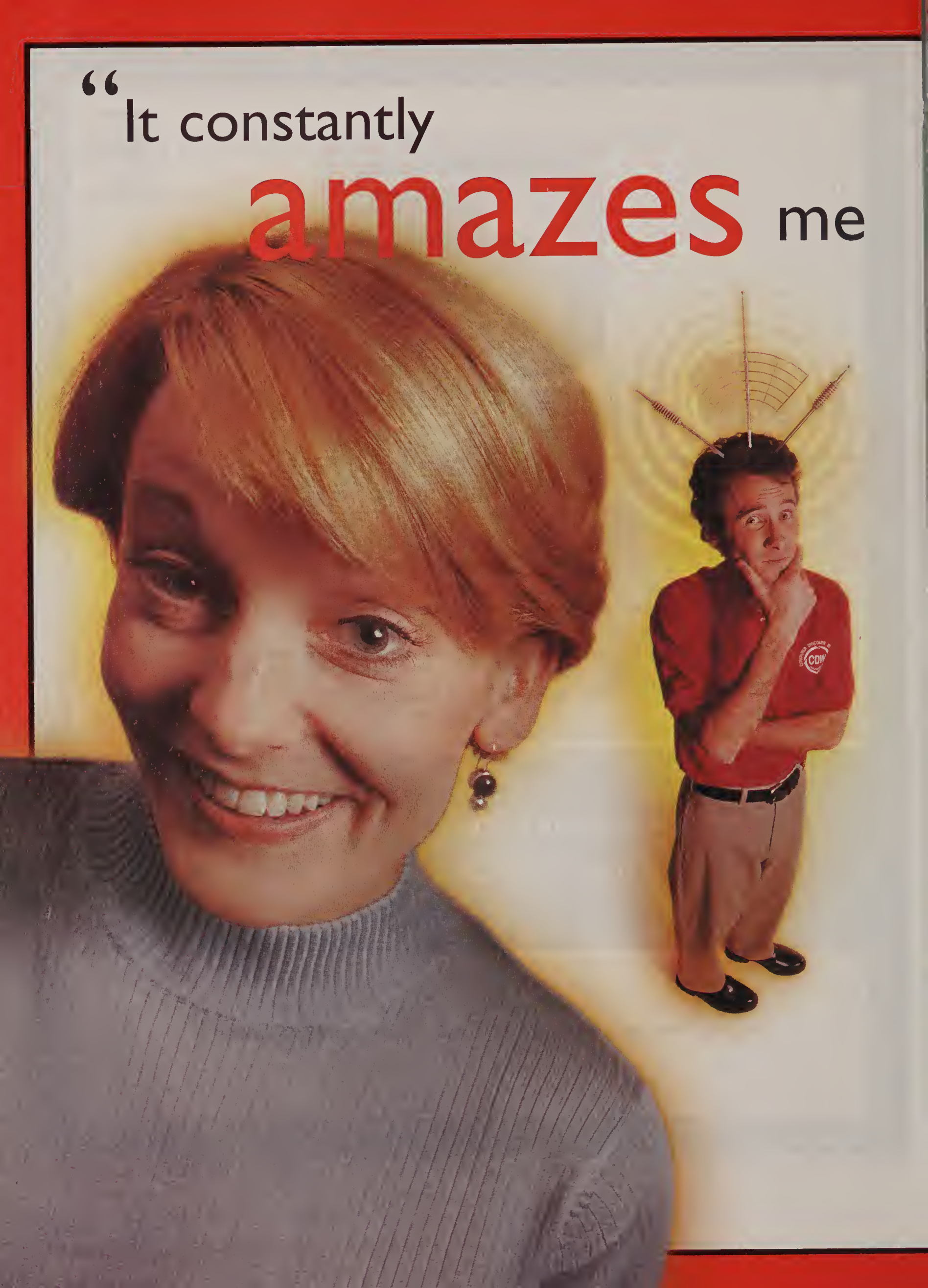
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amazes me

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16-bit sound

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optional CD-ROM
12.1" SVGA active matrix
optional modem
16-bit sound

$3199.00 CDW 78294

Armada 7710MT

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Windows NT V4.0
Enhanced Intelligent Manageability
3-year limited warranty

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266MHz PII/32MB/3.2GB/24X
CDW 95925 **CALL!**

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512KB L2 cache
64MB EDO RAM
4.3GB Ultra SCSI hard drive
24X Max CD-ROM
4MB Matrox Millennium graphics
Windows NT Workstation V4.0
Enhanced Intelligent Manageability
3-year limited warranty

CALL! CDW 95932

233MHz PII/32MB/2.1GB
CDW 95929 **CALL!**

Workstation 6000

Mini-tower
266MHz Pentium II
512KB L2 cache
32MB EDO RAM
4.3GB Ultra SCSI hard drive
24X Max CD-ROM
4MB WRAM
10/100 Ethernet
Windows NT Workstation V4.0
3-year limited warranty

$3879.89 CDW 95933

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Notebooks

Model	Processor	RAM std./max.	Hard drive	CD-ROM	Color display	Modem	Features	Price	CDW
Acer Texas Instruments									
Extensa 610CD	150MHz Pentium	16MB/64MB	1.4GB	10X	11.3" dual scan	-	external floppy	$1964.67	88530
Extensa 610CDT	150MHz Pentium	16MB/64MB	1.4GB	10X	11.3" active matrix	-	external floppy	$2549.84	88531
Extensa 670CD	166MHz Pentium MMX	16MB/80MB	1.6GB	10X	12.1" dual scan	-	16-bit stereo sound	$2699.29	95273
Extensa 670CDT	166MHz Pentium MMX	32MB/80MB	2.1GB	10X	12.1" active matrix	-	SVGA resolution	$3398.45	95275
TravelMate 7060	166MHz Pentium MMX	32MB/64MB	2GB	10X	12.1" active matrix	33.6K bps	16-bit stereo sound	$4289.59	88471
TravelMate 7063NT	166MHz Pentium MMX	32MB/64MB	3GB	10X	12.1" active matrix	33.6K bps	Windows NT V4.0	$4949.69	88472
TravelMate 6160	166MHz Pentium MMX	32MB/96MB	2.1GB	10X	12.1" active matrix	33.6K bps	external floppy	$4699.26	81406
AST Ascentia									
M5130S	133MHz Pentium MMX	32MB	1.6GB	20X	12.1" dual scan	-	Lithium ion battery	$2399.86	95321
M5160T	166MHz Pentium MMX	32MB	1.6GB	20X	12.1" active matrix	-	SVGA resolution	$2946.24	96484
M5200T	200MHz Pentium MMX	32MB	2.1GB	20X	12.1" active matrix	56K bps	SVGA resolution	$3489.25	96485
M5160X	166MHz Pentium MMX	32MB	2.1GB	20X	12.1" active matrix	56K bps	XGA resolution	$3889.25	96507
M5230T	233MHz Pentium MMX	32MB	3.3GB	20X	12.1" active matrix	56K bps	SVGA resolution	$4299.56	96488
M5230X	233MHz Pentium MMX	64MB	4GB	20X	12.1" active matrix	56K bps	XGA resolution	$5299.39	96486
Compaq Armada									
1530DM	133MHz Pentium MMX	16MB/80MB	1.4GB	10X	12.1" dual scan	33.6K bps	full duplex speakerphone	$2399.79	91507
1540DM	150MHz Pentium MMX	16MB/80MB	2.1GB	20X	12.1" dual scan	33.6K bps	SVGA resolution	$2799.00	96613
1550DMT	133MHz Pentium	16MB/80MB	1.4GB	10X	12.1" active matrix	33.6K bps	full duplex speakerphone	$2899.39	87070
1580DMT	150MHz Pentium MMX	16MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	full duplex speakerphone	$3399.10	90959
1590DMT	166MHz Pentium MMX	16/80MB	2.1GB	20X	12.1" active matrix	33.6K bps	SVGA resolution	$3699.00	96612
4130T	133MHz Pentium	16MB/48MB	1.08GB	-	11.8" active matrix	-	16-bit stereo sound	$2459.43	71116
4131T	133MHz Pentium	16MB/48MB	1.4GB	-	12.1" active matrix	-	16-bit stereo sound	$2769.83	80775
4150	150MHz Pentium MMX	16MB/80MB	1.6GB	-	12.1" dual scan	-	16-bit stereo sound	$2899.34	91508
4160T	166MHz Pentium MMX	16MB/80MB	2GB	-	12.1" active matrix	-	16-bit stereo sound	$3999.00	91509
4160T SL	166MHz Pentium MMX	16MB/80MB	2GB	-	12.1" active matrix	-	16-bit stereo sound	$9999.00	96734
7330T	150MHz Pentium MMX	16MB/128MB	2.1GB	-	12.1" active matrix	-	16-bit stereo sound	$3799.00	93735
7350MT	166MHz Pentium MMX	32MB/128MB	2.1GB	-	12.1" active matrix	33.6K bps	16-bit stereo sound	$4499.00	93736
7710MT	150MHz Pentium MMX	16MB/144MB	1.6GB	optional	12.1" active matrix	33.6K bps	64-bit PCI bus	$3699.00	88242
7730MT	166MHz Pentium MMX	32MB/144MB	2.1GB	optional	12.1" active matrix	33.6K bps	64-bit PCI bus	$4399.00	88241
7750MT	166MHz Pentium MMX	32MB/144MB	2.1GB	optional	12.1" active matrix	33.6K bps	64-bit PCI bus	$4999.00	88240
7770DMT	233MHz Pentium MMX	32MB/144MB	3GB	20X	12.1" active matrix	33.6K bps	64-bit PCI bus	$9999.00	96735
Compaq Presario									
1210	150MHz Pentium	16MB/80MB	1.4GB	14X	12.1" dual scan	33.6K bps	16-bit stereo sound	$1999.00	90514
1610	150MHz Pentium MMX	16MB/80MB	1.6GB	14X	12.1" dual scan	-	16-bit stereo sound	$2699.00	90515
1620	166MHz Pentium MMX	16MB/80MB	2.1GB	20X	12.1" dual scan	56K bps	16-bit stereo sound	$2999.00	95098
1585DMT	150MHz Pentium MMX	16MB/80MB	2.1GB	12X	12.1" active matrix	33.6K bps	16-bit stereo sound	$3499.00	92232
Fujitsu LifeBook									
555Tx	150MHz Pentium MMX	16MB/80MB	2GB	10X	12.1" active matrix	33.6K bps	16-bit stereo sound	$3199.00	85008
565Tx	166MHz Pentium MMX	32MB/96MB	2GB	20X	12.1" active matrix	33.6K bps	XGA resolution	$4299.00	92055
635Tx	133MHz Pentium MMX	16MB/80MB	2GB	16X	12.1" active matrix	33.6K bps	16-bit stereo sound	$3199.00	92058
655Tx	150MHz Pentium MMX	16MB/80MB	1.3GB	8X	12.1" active matrix	33.6K bps	external floppy	$3799.00	85013
656Tx	150MHz Pentium MMX	16MB/80MB	2GB	16X	12.1" active matrix	33.6K bps	SVGA resolution	$4299.00	92061

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Notebooks

Model	Processor	RAM std./max.	Hard drive	CD-ROM	Color display	Modem	Features	Price	CDW
Hitachi VisionBook									
4140	133MHz Pentium	16MB/128MB	1.4GB	10X	12.1" dual scan	33.6K bps	16-bit stereo sound	$1799.00	91046
4150x	150MHz Pentium MMX	16MB/128MB	1.4GB	10X	12.1" dual scan	33.6K bps	16-bit stereo sound	$2299.00	91047
4360x	166MHz Pentium MMX	16MB/128MB	2.1GB	10X	12.1" active matrix	33.6K bps	SVGA resolution	$2999.00	91049
7340	133MHz Pentium MMX	16MB/144MB	1.4GB	10X	12.1" active matrix	56K bps	16-bit stereo sound	$3199.00	91051
7360	166MHz Pentium MMX	32MB/144MB	2.1GB	10X	12.1" active matrix	56K bps	16-bit stereo sound	$4299.00	91053
7560	166MHz Pentium MMX	32MB/144MB	3GB	10X	13.3" active matrix	56K bps	XGA resolution	$4799.00	91054
8560	166MHz Pentium MMX	16MB/80MB	2.1GB	10X	13.3" active matrix	56K bps	XGA resolution	$4599.00	91056
Hewlett-Packard OmniBook Notebook PCs									
800CT	166MHz Pentium MMX	16MB/80MB	2GB	-	10.4" active matrix	-	external floppy	$3679.68	85727
2000CS	133MHz Pentium	16MB/128MB	1.4GB	-	12.1" dual scan	-	SVGA resolution	$2049.50	88749
2000CT	133MHz Pentium	16MB/128MB	1.4GB	-	12.1" active matrix	-	32-bit PCI bus	$2344.23	88750
2000CT	133MHz Pentium MMX	16MB/128MB	2GB	-	12.1" active matrix	-	32-bit PCI bus	$3059.23	88751
5700CT	150MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	-	16-bit stereo sound	$3597.52	85720
5700CT	166MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	-	16-bit stereo sound	$4039.53	85721
5700CTX	166MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	-	XGA resolution	$4098.82	85723
5700CTX	166MHz Pentium MMX	32MB/128MB	2.79GB	optional	12.1" active matrix	-	XGA resolution	$4619.09	85722
IBM ThinkPad									
380	150MHz Pentium	16MB/80MB	1.08GB	-	12.1" dual scan	-	16-bit stereo sound	$1669.46	86302
380D	150MHz Pentium MMX	16MB/80MB	2.1GB	8X	12.1" active matrix	-	16-bit stereo sound	$2999.00	86305
380ED	166MHz Pentium MMX	16MB/80MB	2.1GB	20X	12.1" dual scan	-	SVGA resolution	$2587.51	94542
380ED	166MHz Pentium MMX	16MB/80MB	3.0GB	20X	12.1" active matrix	-	16-bit stereo sound	$3599.44	94543
560	133MHz Pentium	8MB/40MB	2.1GB	-	11.3" dual scan	-	external floppy	$1699.89	81184
560	133MHz Pentium	8MB/40MB	2.1GB	-	12.1" active matrix	-	external floppy	$2849.32	81186
560E	150MHz Pentium MMX	16MB/80MB	2.1GB	-	11.3" dual scan	-	16-bit stereo sound	$2599.86	89290
560E	166MHz Pentium MMX	16MB/80MB	2.1GB	-	12.1" active matrix	-	16-bit stereo sound	$4186.26	89291
760ED	133MHz Pentium	16MB/72MB	2.1GB	6X	12.1" active matrix	28.8K bps	XGA resolution	$3739.72	74862
760XL	166MHz Pentium MMX	16MB/104MB	2.1GB	optional	12.1" active matrix	-	16-bit stereo sound	$3769.88	84102
760XD	166MHz Pentium MMX	32MB/104MB	3GB	8X	12.1" active matrix	28.8K bps	XGA resolution	$4679.37	84101
765L	166MHz Pentium MMX	32MB/104MB	3GB	-	12.1" active matrix	-	16-bit stereo sound	$5098.39	89293
765D	166MHz Pentium MMX	32MB/104MB	3GB	8X	13.3" active matrix	28.8K bps	Mwave DSP subsystem	$5499.91	89292
770	200MHz Pentium MMX	32MB/160MB	3.2GB	-	13.3" active matrix	-	Lithium ion battery	$4699.39	94545
770	233MHz Pentium MMX	32MB/160MB	4GB	-	13.3" active matrix	-	Lithium ion battery	$5459.16	94544
770	233MHz Pentium MMX	32MB/160MB	4GB	-	13.3" active matrix	-	Windows NT V4.0	$5899.36	94546
770	233MHz Pentium MMX	32MB/160MB	5.1GB	-	14.1" active matrix	33.6K bps	Lithium ion battery	$6779.05	94547
Toshiba									
Libretto 50CT	75MHz Pentium	16MB/32MB	772MB	-	6.1" active-matrix	-	Lithium ion battery	$1929.45	90350
Satellite 220CDS	133MHz Pentium	16MB/144MB	1.34GB	10X	12.1" dual scan	-	Lithium ion battery	$1899.13	89777
Satellite Pro 440CDX	133MHz Pentium MMX	16MB/144MB	1.34GB	10X	12.1" dual scan	-	Lithium ion battery	$1989.69	90351
Satellite Pro 440CDT	133MHz Pentium MMX	16MB/144MB	1.34GB	10X	12.1" active matrix	33.6K bps	Lithium ion battery	$2799.55	90352
Satellite Pro 460CDT	166MHz Pentium MMX	32MB/160MB	2.02GB	10X	12.1" active matrix	33.6K bps	Lithium ion battery	$3659.16	90353
Portege 300CT	133MHz Pentium MMX	32MB/64MB	1.5GB	-	10.4" active matrix	33.6K bps	external floppy	$3369.46	90354
Portege 660CDT	150MHz Pentium	16MB/80MB	1.2GB	10X	11.3" active matrix	28.8K bps	external floppy	$3189.63	77243
Tecra 510CDT	133MHz Pentium	16MB/144MB	2.1GB	10X	12.1" active matrix	28.8K bps	16-bit stereo sound	$2659.76	77241
Tecra 520CDT	166MHz Pentium MMX	32MB/160MB	2GB	10X	12.1" active matrix	33.6K bps	SVGA resolution	$4159.45	90355
Tecra 530CDT	166MHz Pentium MMX	32MB/160MB	2GB	10X	12.1" active matrix	33.6K bps	XGA resolution	$4579.17	90359
Tecra 730XCDT	150MHz Pentium MMX	16MB/144MB	2GB	10X	12.1" active matrix	28.8K bps	full duplex speakerphone	$3499.77	80957
Tecra 740CDT	166MHz Pentium MMX	16MB/144MB	3GB	10X	13.3" active matrix	28.8K bps	video conferencing kit	$4849.62	87964
Tecra 740CDT	166MHz Pentium MMX	16MB/144MB	3GB	10X	13.3" active matrix	28.8K bps	Windows NT V4.0	$4999.31	87965
Tecra 750CDT	233MHz Pentium MMX	32MB/160MB	4.7GB	20X	13.3" active matrix	56.6K bps	32-bit PCI bus	$6449.23	96534

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Desktops

Model	Processor	Chassis	RAM std./max.	Hard drive	CD-ROM	Video	Modem	Price	CDW
Acer									
Network Ready	200MHz Pentium	desktop	32MB/128MB	2.1GB	optional	64-bit PCI accelerated	-	$996.32	91B67
Network Ready	166MHz Pentium MMX	desktop	16MB/128MB	1GB	optional	64-bit PCI accelerated	-	$938.11	96176
Network Ready	200MHz Pentium MMX	desktop	32MB/128MB	2.1GB	optional	64-bit PCI accelerated	-	$1356.54	9617B
Business MM	166MHz Pentium MMX	desktop	16MB/384MB	2.1GB	20X	64-bit PCI accelerated	-	$1164.32	91BB3
Business MM	200MHz Pentium MMX	desktop	32MB/384MB	3.2GB	20X	64-bit PCI accelerated	-	$1305.73	918B4
Business MM	200MHz Pentium MMX	mini-tower	32MB/384MB	3.2GB	20X	64-bit PCI accelerated	-	$1727.71	91885
Acer Power	166MHz Pentium MMX	desktop	16MB/384MB	2.1GB	BX	64-bit PCI accelerated	-	$1129.10	91B72
AST Bravo									
MS 5166M	166MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	-	$1514.69	B9552
MS 5200/M	200MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	-	$1696.69	91570
MS 5233/M	233MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	-	$1849.48	95B13
MS 6266	266MHz Pentium II	desktop	32MB/256MB	4.3GB	16X Max	ATI 3D RAGE II	-	CALL!	95B17
MS 3000C/95	200MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	-	$1696.69	91570
LC 5166M	166MHz Pentium MMX	desktop	16MB/384MB	2GB	optional	ATI mach64 VT3	-	$1115.18	932BB
LC 5200M	200MHz Pentium MMX	desktop	32MB/384MB	2GB	optional	ATI mach64 VT3	-	$1339.17	95B11
LC 6233	233MHz Pentium II	mini-tower	32MB/384MB	2GB	optional	S3 ViRGE/DX 3D	-	$2099.23	B9108
LC 6233	233MHz Pentium II	mini-tower	32MB/384MB	2GB	optional	S3 ViRGE/DX 3D	-	$2197.23	B9107
Compaq Deskpro 2000									
5166X/2100	166MHz Pentium MMX	desktop	16MB/384MB	2.1GB	optional	S3 Trio64V2/GX	-	$1169.00	92269
5166X/3200	166MHz Pentium MMX	desktop	16MB/384MB	3.2GB	optional	S3 Trio64V2/GX	-	$1219.00	92B3B
5166X/3200	166MHz Pentium MMX	mini-tower	16MB/384MB	3.2GB	16X Max	S3 Trio64V2/GX	-	$1529.00	92B39
5200X/2100	200MHz Pentium MMX	desktop	16MB/384MB	2.1GB	optional	S3 Trio64V2/GX	-	$1319.00	92B40
5200X/3200/CDS	200MHz Pentium MMX	mini-tower	32MB/384MB	3.2GB	16X Max	S3 Trio64V2/GX	-	$1679.00	92842
5200X/3200	200MHz Pentium MMX	desktop	32MB/384MB	3.2GB	optional	S3 Trio64V2/GX	-	$1489.00	92B41
5233X/3200/CDS	233MHz Pentium MMX	desktop	32MB/384MB	3.2GB	16X Max	S3 Trio64V2/GX	-	$1859.00	92B43
6233X/2100	233MHz Pentium II	desktop	32MB/384MB	2.1GB	optional	Matrox 1064-SG	-	CALL!	95916
6233X/3200/CDS	233MHz Pentium II	desktop	32MB/384MB	3.2GB	24X Max	Matrox 1064-SG	-	CALL!	95917
6266X/3200/CDS	266MHz Pentium II	desktop	32MB/384MB	3.2GB	24X Max	Matrox 1064-SG	-	CALL!	9591B
6266X/3200/CDS	266MHz Pentium II	mini-tower	32MB/384MB	3.2GB	24X Max	Matrox 1064-SG	-	CALL!	95919
6300X/3200/CDS	300MHz Pentium II	mini-tower	32MB/384MB	3.2GB	24X Max	Matrox 1064-SG	-	CALL!	95920
Compaq Deskpro 4000									
5166X/2400	166MHz Pentium MMX	desktop	16MB/256MB	2.4GB	optional	S3 ViRGE/GX	-	$1389.00	92B44
5166X/3200	166MHz Pentium MMX	desktop	32MB/256MB	3.2GB	optional	S3 ViRGE/GX	-	$1599.00	92B45
5166X/3200/CDS	166MHz Pentium MMX	mini-tower	32MB/256MB	3.2GB	16X Max	S3 ViRGE/GX	-	$1799.00	92846
5200X/2400	200MHz Pentium MMX	desktop	32MB/256MB	2.4GB	optional	S3 ViRGE/GX	-	$1689.00	92B47
5200X/3200	200MHz Pentium MMX	desktop	32MB/256MB	3.2GB	optional	S3 ViRGE/GX	-	$1759.00	92B4B
5233X/3200X/CDS	233MHz Pentium MMX	mini-tower	32MB/256MB	3.2GB	16X Max	S3 ViRGE/GX	-	$2129.00	92B49
6233X/2400X	233MHz Pentium II	mini-tower	32MB/256MB	2.4GB	optional	Matrox 1064-SG	-	CALL!	95921
6233X/3200X	233MHz Pentium II	mini-tower	32MB/256MB	3.2GB	24X Max	Matrox 1064-SG	-	CALL!	95922
6266X/3200X	266MHz Pentium II	mini-tower	32MB/256MB	3.2GB	24X Max	Matrox 1064-SG	-	CALL!	95924
6233X/3200X	233MHz Pentium II	mini-tower	32MB/256MB	3.2GB	24X Max	Matrox 1064-SG	-	CALL!	95923
6266X/3200X	266MHz Pentium II	mini-tower	32MB/256MB	3.2GB	24X Max	Matrox 1064-SG	-	CALL!	95925
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6233X/2100/CDS	233MHz Pentium II	desktop	32MB	2.1GB	24X Max	Matrox Millennium II	-	CALL!	95929
6266X/2100/CDS	266MHz Pentium II	desktop	32MB	2.1GB	24X Max	Matrox Millennium II	-	CALL!	95930
6266X/4300/CDS	266MHz Pentium II	desktop	32MB	4.3GB	24X Max	Matrox Millennium II	-	$3199.81	95931
6300X/4300/CDS	300MHz Pentium II	desktop	64MB	4.3GB	24X Max	Matrox Millennium II	-	$3879.89	95933
6266X/4300/CDS	266MHz Pentium II	mini-tower	64MB	4.3GB	24X Max	Matrox Millennium II	-	CALL!	95932
6300X/4300/CDS	300MHz Pentium II	mini-tower	64MB	4.3GB	24X Max	Matrox Millennium II	-	CALL!	95934

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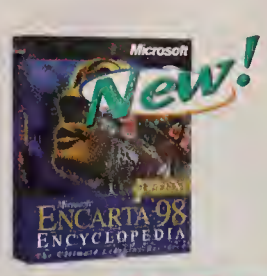
Compaq Presario									
2200	180MHz processor with MediaGX	desktop	16M8/64M8	1.6G8	8X	MPEG full-motion playback	33.6K bps	$799.00	92852
4505	166MHz Pentium MMX	mini-tower	16M8/64M8	2.1G8	16X Max	64-bit PCI accelerated	33.6K bps	$999.00	95066
4508	200MHz Pentium MMX	mini-tower	24M8/64M8	3.2G8	16X Max	64-bit PCI accelerated	33.6K bps	$1499.00	90510
4528	233MHz Pentium MMX	mini-tower	32M8/64M8	3.2G8	24X Max	64-bit PCI accelerated	33.6K bps	$1799.00	90511
4814	233MHz Pentium II	mini-tower	32M8/256M8	6.5G8	24X Max	64-bit PCI accelerated	56K bps	$1999.00	90512
HP Brio Series									
8012	166MHz Pentium MMX	mini-tower	16M8/128M8	2.1G8	optional	S3 Trio 64V2	-	$999.53	95050
8014	200MHz Pentium MMX	mini-tower	16M8/128M8	2.1G8	optional	S3 Trio 64V2	-	$1154.35	95052
8017	233MHz Pentium MMX	mini-tower	32M8/128M8	3.2G8	optional	S3 Trio 64V2	-	$1449.95	95053
8032	166MHz Pentium MMX	mini-tower	16M8/128M8	2.1G8	16X Max	S3 Trio 64V2	-	$1149.54	95054
8034	200MHz Pentium MMX	mini-tower	32M8/128M8	2.1G8	16X Max	S3 Trio 64V2	-	$1419.35	95055
8037	233MHz Pentium MMX	mini-tower	32M8/128M8	3.2G8	24X Max	S3 Trio 64V2	-	$1649.54	95056
8172	166MHz Pentium MMX	mini-tower	16M8/128M8	2.1G8	16X Max	S3 Trio 64V2	56.6K bps	$1379.29	95057
8175	200MHz Pentium MMX	mini-tower	32M8/192M8	2.1G8	24X Max	S3 Trio 64V2	56.6K bps	$1749.63	95059
8178	233MHz Pentium MMX	mini-tower	32M8/192M8	6G8	24X Max	Matrox Millennium	56.6K bps	$2117.37	95061
HP Vectra VE Series 3 PC									
VE3 5/200	200MHz Pentium	desktop	16M8/192M8	1G8	optional	SiS 6205	-	$1047.24	96382
VE3 5/166M	166MHz Pentium MMX	desktop	16M8/192M8	1.6G8	optional	SiS 6205	-	$1164.09	96383
VE3 5/200M	200MHz Pentium MMX	desktop	16M8/192M8	1.6G8	optional	SiS 6205	-	$1236.55	96384
VE3 5/166M	166MHz Pentium MMX	desktop	16M8/192M8	1.6G8	24X	SiS 6205	-	$1345.25	96389
HP Vectra VL Series 5 PC									
VL5 5/166M	166MHz Pentium MMX	desktop	32M8/192M8	2.5G8	-	2M8 S3 Trio64 V2	-	$1459.70	95736
VL5 5/200M	200MHz Pentium MMX	desktop	32M8/192M8	2.5G8	24X	2M8 S3 Trio64 V2	-	$1678.26	95732
VL5 5/166M	166MHz Pentium MMX	mini-tower	16M8/192M8	2.5G8	24X	2M8 S3 Trio64 V2	-	$1499.15	95731
VL5 5/200M	200MHz Pentium MMX	mini-tower	32M8/192M8	2.5G8	24X	2M8 S3 Trio64 V2	-	$1739.59	95733
VL5 5/233M	233MHz Pentium MMX	mini-tower	32M8/192M8	4G8	24X	2M8 S3 Trio64 V2	-	$1967.75	95734
IBM Aptiva									
C3D	233MHz Pentium MMX	mini-tower	32M8/64M8	4.2G8	8X DVD	ATI 3D RAGE II	33.6K bps	$2499.27	90535
S3C	233MHz Pentium MMX	mini-tower	32M8/64M8	4.2G8	16X Max	ATI 3D RAGE II	33.6K bps	$2159.29	90537
S35	233MHz Pentium MMX	mini-tower	48M8/64M8	6.4G8	24X Max	ATI 3D RAGE II	33.6K bps	$2499.27	90538
IBM PC Series									
PC 300GL	166MHz Pentium MMX	desktop	32M8/128M8	2.5G8	optional	Cirrus Logic 5446	-	$1299.00	94858
PC 300GL	200MHz Pentium MMX	desktop	32M8/128M8	2.5G8	16X Max	Cirrus Logic 5446	-	$1589.00	89296
PC 300PL	166MHz Pentium MMX	desktop	32M8/384M8	2.5G8	optional	Matrox Mystique	-	$1469.45	94010
PC 300PL	200MHz Pentium MMX	desktop	32M8/384M8	4.2G8	24X Max	Matrox Mystique	-	$1855.20	94014
PC 300PL	233MHz Pentium MMX	desktop	32M8/384M8	4.2G8	24X Max	Matrox Mystique	-	$2159.92	94015
PC 300PL	166MHz Pentium MMX	mini-tower	32M8/384M8	2.5G8	optional	Matrox Mystique	-	$1588.64	94019
PC 300PL	200MHz Pentium MMX	mini-tower	32M8/384M8	4.2G8	24X Max	Matrox Mystique	-	$1997.95	94021
PC 300PL	233MHz Pentium MMX	mini-tower	32M8/384M8	4.3G8	24X Max	Matrox Mystique	-	$2615.83	94023
PC 300XL	233MHz Pentium II	desktop	32M8/384M8	2.5G8	16X Max	S3 Trio64V2	-	$2275.14	86313
PC 300XL	266MHz Pentium II	desktop	32M8/384M8	4.2G8	16X Max	S3 Trio64V2	-	$2659.12	86315
PC 300XL	266MHz Pentium II	desktop	32M8/384M8	4.3G8	16X Max	S3 Trio64V2	-	$2949.24	86316
Toshiba									
Equium 5200D	200MHz Pentium MMX	desktop	32M8/192M8	2.38G8	12X	2M8 ATI 3D RAGE II	-	$1549.64	84249
Equium 6200D	200MHz Pentium Pro	desktop	32M8/128M8	2.95G8	12X	2M8 S3 ViRGE 3D	-	$2118.60	84251
Equium 6200M	200MHz Pentium Pro	mini-tower	32M8/512M8	4.24G8	12X	2M8 ATI 3D RAGE II+	-	$2479.47	84252
Equium 5230D	233MHz Pentium MMX	desktop	32M8/192M8	3G8	24X Max	2M8 ATI 3D RAGE II+	-	$1798.36	95209
Equium 6230D	233MHz Pentium II	desktop	32M8/192M8	3G8	24X Max	2M8 ATI 3D RAGE II+	-	$2199.43	95208
Equium 6260M	266MHz Pentium II	mini-tower	32M8/256M8	3.73GB	16X	4M8 ATI 3D RAGE II+	-	$2569.07	93106
Infinia 7230	166MHz Pentium MMX	mini-tower	32M8/128M8	2.38G8	12X	2M8 S3 ViRGE 3D	33.6K bps	$1649.89	84559
Infinia 7231	200MHz Pentium MMX	mini-tower	32M8/128M8	3G8	12X	2M8 S3 ViRGE 3D	33.6K bps	$1989.24	84560



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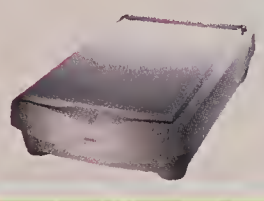

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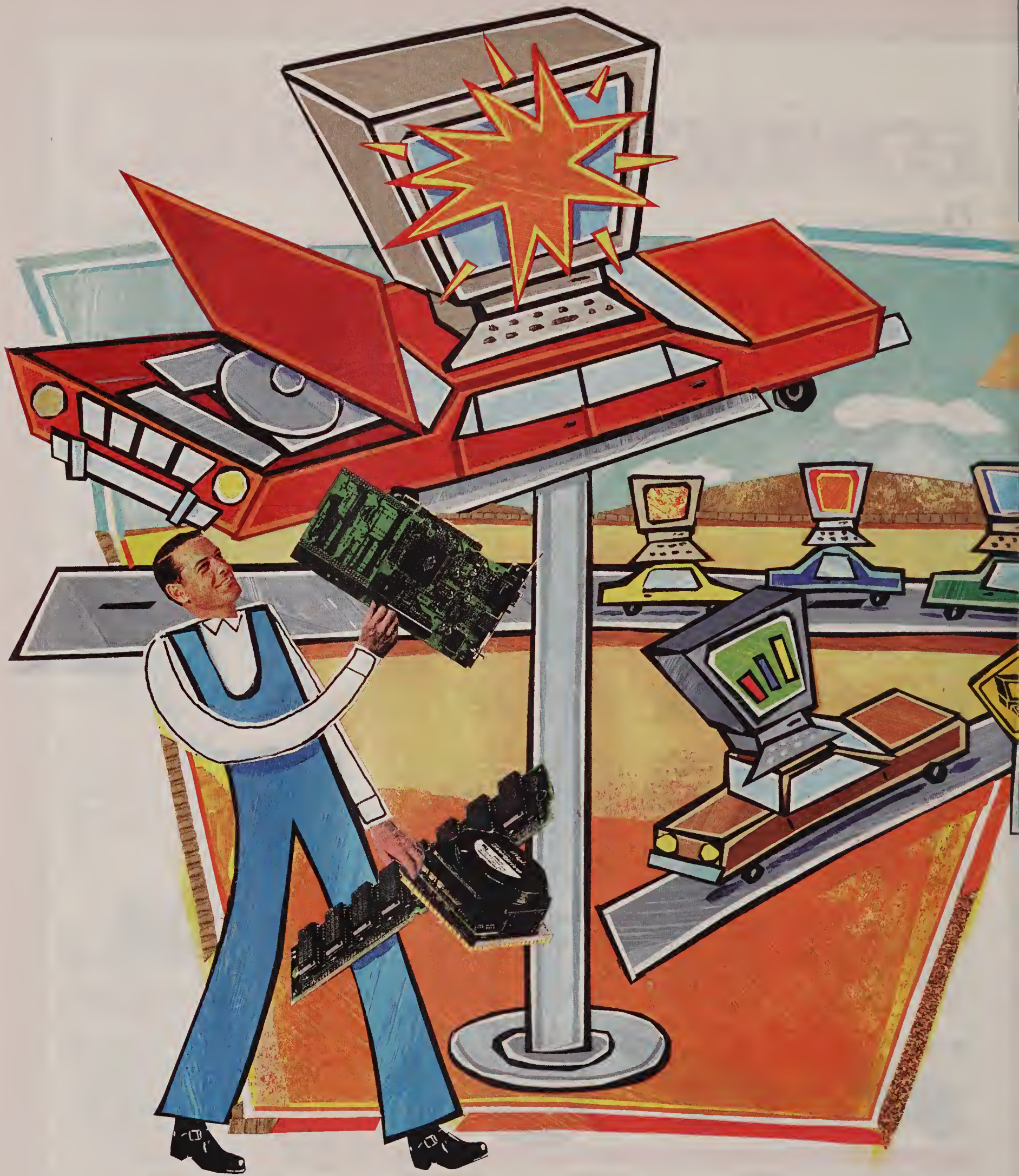


Pentium-166 OverDrive chips are delivering true

and 3D boards are everywhere. Upgrading

CAN'T-MISS UPGRADES

STOP! Do not throw that PC out the window! We know you want to. And yes, it deserves to crash and burn: It takes 30 seconds to load the Open File dialog box in Word 97, it can't handle 3D games or MMX software, it stutters and stalls when you run the latest multimedia CD-ROMs. . . . But why trash your aging computer when you can reinvent it?

During World War II, when common items like sugar and zoot suits were in short supply, there was a rhyme that went: "Use it up, wear it out, make it do, or do without." It's not a bad attitude for performance-challenged PC users—especially when a new system ballparks at around $2000 and up.

If you're one of millions of PC users who made the Pentium leap three years ago, you probably have something like a P-75 or P-100 with 16MB of RAM. There was no way then to know how fast CPUs would get, or that hip dudes in fluorescent space suits would herald the promise of something called MMX, or even that 3D graphics would become the rage in software games.

How can you catch up with the times? More than ever before, the best way to give your aging Pentium a performance boost is to upgrade your CPU and RAM.

For this year's upgrades extravaganza, we tested five upgrade processors. We put three chips—a 125-MHz Intel Pentium MMX OverDrive, an Evergreen PR-166, and a prerelease Evergreen MxPro-233—into a Gateway 2000 P-75 system. In addition, we popped a 166-MHz Intel Pentium MMX OverDrive and an ▶

ILLUSTRATIONS BY TOM GARRETT

PMMX-166 performance, RAM is falling from the sky, today is more than smart, it's brilliant.

BY MICHAEL GOODWIN

early version of the 200-MHz Pentium MMX OverDrive into a Compaq ProLinea P-100 PC. (Kingston's new TurboChip 200, which boosts PCs to PMMX-200 level, was not available in time for testing.)

To find out how much these upgrade chips boost performance, we ran each system through our PC WorldBench test suite with their original processors. We also ran the systems through a series of tests using MMX software. Then we installed the processor upgrades and ran the tests again.

We also checked to see if bumping up the amount of memory in our test systems from 16MB to 32MB would speed up applications. And finally, we combined each CPU upgrade with a 16MB RAM upgrade and ran the test suite once more. Envelope, please.

FLASH! TRUE PMMX-166 PERFORMANCE FOR $300!

THE BIG NEWS this year for 16MB Pentium-100 owners is that our 166-MHz Pentium MMX OverDrive chip plus a 16MB RAM upgrade delivered performance close to what you'd get if you bought a new PMMX-166 system. And you can have it all for about $300. Our upgraded Compaq turned in an overall PC WorldBench score of 203 (a 22 percent increase over the base model P-100); the average 32MB Pentium MMX-166 system we've tested scores 216.

If you're upgrading a P-75 or P-100, a chip/RAM combo is a smart deal.

If you're upgrading a P-75, the chip/RAM combination is also a smart deal. When we put a 125-MHz MMX OverDrive chip and 16MB of RAM in our Gateway 2000 P-75 system, we got a PC WorldBench score of 162—a 28 percent performance increase. Mind you, that's not on a par with P-120 performance (the average P-120 with 32MB scores 187), and it's not quite P-100 performance (the average P-100 with 32MB scores 176). But it's a lot faster than your P-75 currently runs—and again will cost only about $300. In fact, as we went to press, Intel was phasing out the 125-MHz upgrade chip in favor of a new 180-MHz version, which means that retailers still carrying the 125-MHz could sell you the chip plus RAM for well under $300.

When it comes to Evergreen's new upgrade chips, our advice is to proceed with caution. The Evergreen MxPro-233 is the fastest CPU upgrade we've seen. Each Evergreen CPU, however, requires a BIOS update, and making sure you have a compatible system can be a chore. Evergreen is constantly updating its list of compatible systems, so check the company's Web site (www.evertech.com) before proceeding. But considering that you don't save much money by choosing Evergreen's new MMX upgrades over Intel's (Evergreen's MMX chips cost from $199 to $499), we would go with the Intel products.

And what about just adding more memory to your worn-out P-100 or P-75? Only if you run lots of programs at once. An extra 16MB of RAM in a 16MB system may be good for multitasking (something our test suite does not do), but it boosts speed in single applications by just a rather meager 2 percent.

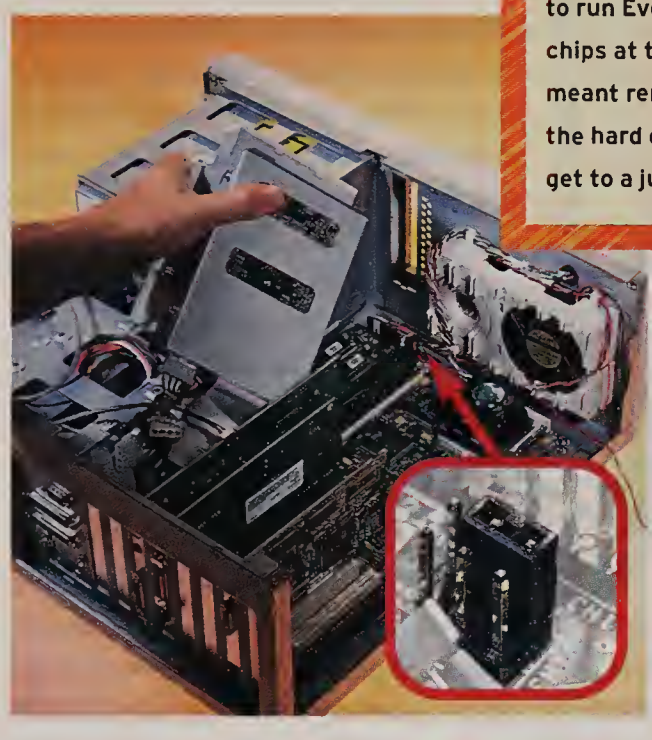
MORE THAN SPEED

DID YOU KNOW that upgrading your graphics board could do more for your PC than adding 16MB of RAM? Are you wondering whether to get an IDE or a SCSI hard drive? And is it time you got yourself a DVD-ROM drive? Depending on how you use your PC, it may need an enhancement upgrade, like a 3D graphics board, a roomier hard disk, or a faster CD-ROM drive. After discussing your CPU and RAM options, we'll guide you through picking the right add-ons without breaking the bank.

In the end, only you can decide how much is too much to spend on upgrading your

Which Upgrade Is Right for You?

IF YOU HAVE A...	THE BEST UPGRADE IS...	WHY?	TOTAL COST
486 in any configuration	Buy a whole new PC.	Because it's time. Think of the acronyms your 486 has never heard of: PCI, MMX, USB. In short, it can't handle the latest software and hardware.	$2000 and up
Pentium (any speed) with 8MB of RAM	Add 8MB of RAM.	Tests we did last year show that you get a 27 to 31 percent boost in speed when you go from 8MB to 16MB.	$50
Pentium-60 with 16MB of RAM	Add 16MB and a 120-MHz Intel OverDrive.	When we tested this OverDrive chip in April 1996 ("Turbocharge Your Pentium PC"), we saw a 21 percent speed boost. Add the extra RAM and it's a new PC for peanuts.	$250
Pentium-75 with 16MB of RAM	Add 16MB and a 125-MHz Intel OverDrive with MMX.	The new processor provides a significant performance boost. The extra RAM doesn't do much for speed—but at this price, why not add it anyway?	$300
Pentium-100 with 16MB of RAM	Add 16MB and a 166-MHz Intel OverDrive with MMX.	The added RAM and the CPU upgrade together bring a P-100 PC nearly in line with a new PMMX-166 system.	$300
Pentium-120 or higher with 16MB of RAM	Add 16MB of RAM.	The RAM helps if you multitask or work with large graphics. But when it comes to a CPU upgrade, the choices available don't deliver enough bang for your buck.	$60 to $100



BOOSTING our PC to run Evergreen chips at top speed meant removing the hard drive to get to a jumper.

PC. We suggest you draw the line at $600: $300 for a performance upgrade and $300 for an enhancement upgrade. Drop more than that, and you're better off buying a brand-new system with the latest features and a nice new warranty.

That said, let's spend your money. First up: performance.

CPUs and RAM

CONCENTRATE on the parts, not the whole. Your CPU and RAM are the best candidates for a performance overhaul. They're inexpensive, and they don't require an engineering degree to install. If you want to roll up your sleeves and upgrade the whole motherboard, check out the July issue's *Upgrade Guide*.

Intel's 166-MHz and 125-MHz MMX OverDrive chips are both huge improvements over the earlier, MMX-less versions. When we looked at Pentium OverDrive chips a year ago, their paltry speed boosts didn't justify their $379 to $679 prices (see "Upgrades: The Best for the Buck," November 1996). But the newer MMX OverDrive chips are very affordable, at $219 each, and they can really accelerate the programs you run.

For now, though, stay away from the 200-MHz MMX OverDrive chip. In our tests, it was only 6 percent faster than the P-166 version—but its $349 price tag is nearly 60 percent higher. When its cost falls below $300, you might decide to pay for the extra speed.

Our Gateway P-75, which started with a 127 PC WorldBench score, leapt to a solid 160 with the 125-MHz MMX OverDrive installed. That's a 25 percent improvement and nearly on a par with the average PC WorldBench score for all 16MB Pentium-100 systems we've tested, though short of the 125-MHz speed one might expect.

Of course, not all systems are created equal. For kicks we pulled out a Hewlett-Packard Vectra P-75 with 16MB of RAM and dropped in a 125-MHz MMX OverDrive. In its original configuration, the Vectra ran up a PC WorldBench score of 148. With the OverDrive in place, its score jumped to 183—nearly 24 percent faster, and slightly better than our average PC WorldBench score for Pentium-133 systems with 16MB of RAM. The Vectra's scores are higher than the Gateway P-75's, but the speed increase from the MMX OverDrive is almost identical.

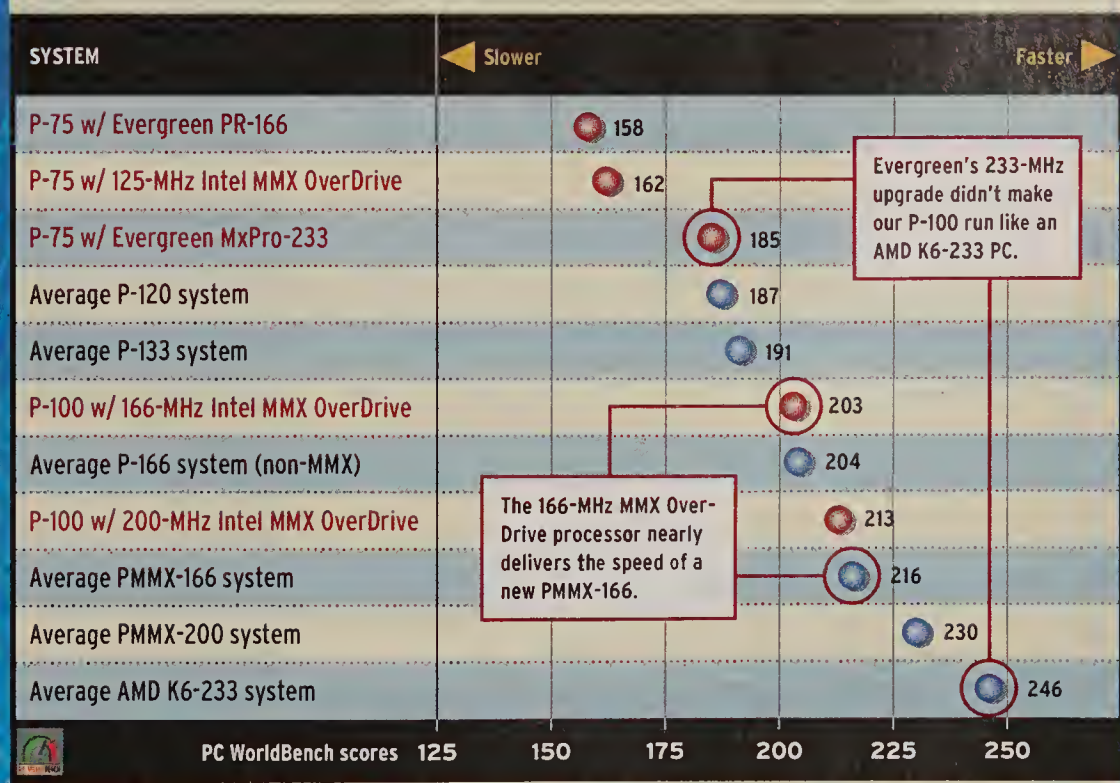
The 16MB Compaq ProLinea P-100 didn't show quite as big a percentage improvement. With the 166-MHz MMX OverDrive installed it climbed from a PC WorldBench score of 166 to 196, an 18 percent speed-up. But there's no shame in this: Our PC WorldBench average for a P-166 system with 16MB of RAM (without MMX) is 194, so the souped-up ProLinea is definitely in the ballpark.

The 200-MHz MMX OverDrive also provided a solid speed boost to our Compaq P-100, but didn't blow away the 166-MHz version. Its PC WorldBench score of 207 was about 25 percent higher than the Compaq's original score.

As you'd expect, though, all of Intel's MMX OverDrive chips give you ▶

Upgrades Versus New PCs

Let's be honest. Just because you put a CPU upgrade in your PC doesn't mean you'll get the kind of performance you'd expect from a brand-new system. Depending on the PC you start with, your mileage may vary. In our tests on systems with 32MB of RAM, some upgrade chips excelled, but others didn't approach the speed of a new, similarly configured PC.



HOW WE TEST The 125-MHz MMX OverDrive, Evergreen PR-166, and Evergreen MXPro-233 were tested in a Gateway P-75 system. The 166-MHz and 200-MHz MMX OverDrives were tested in a Compaq P-100 system. Averages include all systems tested in the PC World Test Center. For details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

PHOTOGRAPH: KEVIN CANDLAND

faster performance in applications written to take advantage of MMX, such as full-screen video and graphics, real-time animation, and "3D" audio. Admittedly, not many programs use MMX yet, but they're coming (see this issue's *Top of the News* for more details). Some of the MMX titles available now include Adobe Photoshop 4, CorelDraw 7, Macromedia Director 6, plus several games such as UbiSoft Entertainment's Pod and GT Interactive's Rebel Moon Rising.

SPEED ISN'T EVERYTHING

UNFORTUNATELY, not every CPU upgrade is so easy, and Evergreen's processors can be especially trying. First of all, you'll need to find out if the Evergreen chip will work in your PC. Each upgrade kit comes with a compatibility list. At press time the list was quite short, but it included several models from Dell, Gateway 2000, and Packard Bell. Evergreen is constantly updating the list, so check its Web site for the latest.

All of Intel's OverDrive chips give you faster performance in MMX programs.

Once you determine that you can use the Evergreen chip in your PC, you need to run the install program and upgrade your system's BIOS. After that's done, you must attach the cooling fan to the upgrade chip. From there, you replace the old CPU, rerun the installation software, and make sure everything is working properly.

The first computer in which we tried to install an Evergreen chip—an HP Vectra—turned out to be incompatible with the new processor. Even in what Evergreen assured us was a compatible Gateway 2000 P-75, it took several tries (and a visit from an Evergreen technician) to get the chip to work prop-

TEST REPORT

CPU and RAM Upgrades Make Sense

Extra memory and a new processor can breathe new life into your aging Pentium system.

	CONFIGURATION	RAM (MB)	PC WorldBench score	Boost %
GATEWAY PENTIUM-75	Baseline Pentium-75	16	127	–
	with 16MB added	32	130	2.1
	with Evergreen PR-166 (166 MHz, non-MMX)	16	154	20.7
	with Evergreen PR-166, 16MB added	32	158	24.3
	with Intel MMX OverDrive (125 MHz)	16	160	25.4
	with Intel MMX OverDrive (125 MHz), 16MB added	32	162	27.5
	with Evergreen MxPro-233 (233 MHz, MMX)[1]	16	181	42.1
	with Evergreen MxPro-233, 16MB added	32	185	45.5
COMPAQ PENTIUM-100	Baseline Pentium-100	16	166	–
	with 16MB added	32	170	2.6
	with Intel MMX OverDrive (166 MHz)	16	196	18.3
	with Intel MMX OverDrive (166 MHz), 16MB added	32	203	22.3
	with Intel MMX OverDrive (200 MHz)[1]	16	207	24.9
	with Intel MMX OverDrive (200 MHz), 16MB added	32	213	28.5

Application test times (Faster ◀ ▶ Slower): Minutes 0, 10, 20, 30, 40, 50

Word 7.0 for Windows 95 · Excel 7.0 for Windows 95 · Picture Publisher 6.0 for Windows 95 · Paradox 5.0 for Windows · WordPerfect 6.1 for Windows · 1-2-3 release 5 for Windows

[1]Results for the Evergreen MxPro-233 and 200-MHz Intel MMX OverDrive are based on prerelease versions of the chips.

HOW WE TEST We tested processor upgrades from Evergreen Technologies and Intel. Using a 75-MHz Pentium from Gateway 2000, we replaced the original CPU with two upgrade chips from Evergreen and one from Intel, testing the system before and after the swap. Similarly, using a 100-MHz Pentium from Compaq, we replaced the original CPU with two Intel upgrade chips, testing before and after. We tested PCs with 16MB and 32MB. Higher PC WorldBench scores are better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

erly because the setup program could not recognize the machine's BIOS.

Once we had it working, Evergreen's PR-166 chip, based on a 133-MHz Cyrix 6x86 P166+ processor, pushed our Gateway P-75 clunker from a PC WorldBench score of 127 to 154—a 21 percent jump, but not quite as good as the 25 percent boost we got with the Intel OverDrive. The Evergreen also lacks MMX support.

Naturally, Evergreen's MxPro-233, based on Advanced Micro Devices' 233-MHz K6-233 chip, was a lot faster: Even without added memory, it boosted the Gateway from a 127 to a 181 PC WorldBench score—a 42 percent increase. That's impressive, but the score is still nowhere near the 246 average of the AMD K6-233 PCs we've tested.

A KICK IN THE PANTS

IF THOSE PERFORMANCE numbers seem a bit underwhelming, Evergreen offers a Hackers' Adventure Option: If you're willing to reset some of your motherboard jumpers (the ones your system manual tells you *never* to touch), you may be able to achieve a 60 percent performance boost. We tried it, and it worked, but we really can't recommend it for the faint of heart. For one thing, you never know where the elusive jumpers are located. We had to remove a hard drive to get to the ones in our Gateway P-75 system.

Basically, in this trick Evergreen is recommending that you reset the bus speed in your PC. The bus in a P-75 runs at 50 MHz; in a P-90 or P-120 it runs at 60 MHz, and in a P-100 or P-133 it runs at 66 MHz. We bumped our P-75's motherboard up to 60 MHz and performance skyrocketed. The PR-166 posted a PC WorldBench score of 177—a 39 percent increase—while the MxPro-233 hit a score of 201, a 58 percent increase.

Evergreen says you'll get the most speed out of its upgrade chips if you have at least 256K of secondary cache. Our test system had 256K of cache, but because we did not test the chips in a system with no secondary cache, we could not confirm Evergreen's claim.

Without a doubt, Evergreen's MxPro-233 gives the biggest boost to tired P-75 systems. But it's expensive, and it may not work in your PC. By the time you read this, Evergreen will also have 166-MHz ($199) and 200-MHz ($349) versions of the MxPro. Considering that they aren't any cheaper than Intel's equivalent MMX upgrade chips and that you'll still have to jump through hoops to get them to work their best, they're probably not worth the compatibility headaches.

ADD RAM AND STIR

EVERYONE KNOWS that adding memory speeds up performance, and everyone is right. The only question is how much, and at what price?

Windows 95 will run with 8MB of system memory, but not very well—which is why most of our readers (and all our test systems) start out with 16MB of RAM. And if they don't, they should. According to last year's tests, the difference between a Pentium-75 with 8MB and one with 16MB is a performance boost of just over 29 percent.

But is it worth the time, trouble, and cost to upgrade from 16MB to 32MB? Our test results say no, but our instincts say yes. This is because our PC WorldBench test suite runs one program at a time, and when you're running single applications with 32MB, your performance boost won't be nearly as dramatic as when you moved from 8MB to 16MB. On our Gateway P-75 and Compaq P-100 systems, going from 16MB to 32MB raised speed a mere 2 percent, whether or not you've upgraded the CPU.

But these days, 16MB of RAM sells for under $100; if you look hard enough you can get it for around $60. To some ▶

Doctor, the 486 Is Fading

STILL NURSING an old 486-based PC? Maybe you got a great deal on a used model, or maybe you just haven't mustered the strength to drop $2000 on a hot new Pentium. What can you do?

To be honest, our first and best advice is to bite the bullet and get a new PC. Technology has come a long way since the 486: There's faster memory, 3D graphics, huge hard drives—and MMX, which not only speeds up day-to-day software but also enhances multimedia applications.

But if you love your 486, there are a couple things you can do to eke out a few more miles.

■ **Add RAM.** If you have 8MB, get another 8MB. Depending on your 486, it can boost performance by 20 percent. Upgrading from 16MB to 32MB won't do a lot for performance when you run single applications, but if you multitask, it will help a lot.

Be careful when you look for RAM. You might need 30-pin modules rather than today's common 72-pin SIMMs, and they can be hard to find.

■ **Add a new CPU.** Once you have 16MB, you can get yourself up to the speed of an 8MB P-75 by adding one of several CPU upgrades.

Who's still making CPU upgrades for your aging 486? If you look around, you can find Evergreen's 586/133 chip and the corresponding TurboChip 133 from Kingston (800/337-8410) for under $130. Intel's Pentium OverDrive for 486 costs a bit more, but it's still under $200. And if all you want is a little boost for your 486, you can buy Intel's DX4/100 upgrade for under $75. Just make sure you check with the chip vendor to ensure that the upgrade kit you're considering is compatible with your 486.

people, a 2 percent increase may be worth $60. But you should also consider that 32MB of RAM in a Pentium system will help enormously when you're multitasking. And as time passes, you may well see an even *bigger* performance boost from your memory transplant if you plan on upgrading to the newest (and bulkiest) business programs like Word 97, many of which virtually demand 32MB of RAM.

In addition, if you work with large graphics files, 32MB will come in handy. Although the extra 16MB of RAM made little or no difference in many of our MMX tests, the ones in which we manipulated big graphics files definitely got a large boost. For instance, when we increased the size of an on-screen image in Adobe Photoshop, our 16MB Gateway P-75 accomplished the task in 4 minutes and 26 seconds. When we increased the RAM to 32MB, it took 2 minutes and 57 seconds (a 33 percent improvement). In our 16MB Compaq P-100 the task took 3 minutes and 35 seconds; with an extra 32MB, it took 2 minutes and 3 seconds (a 43 percent boost).

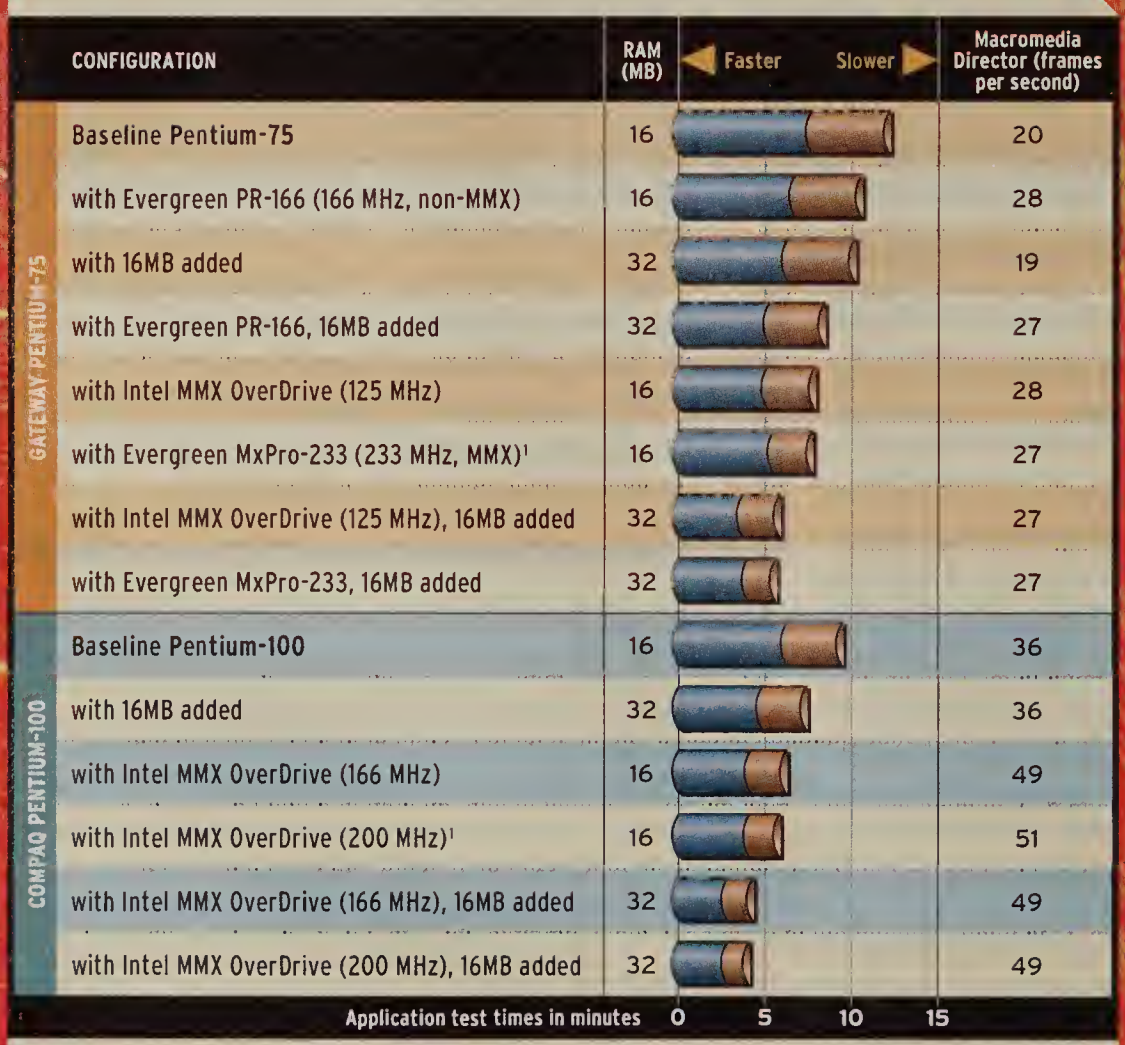
If you work with large graphics files, 32MB will come in handy.

If you plan to create 3D models, you'll also appreciate 32MB. Adding Gouraud shading to a 3D model in Fractal Design Ray Dream Studio took 1 minute and 29 seconds on our 16MB Gateway P-75; the same task took just 1 minute and 12 seconds when we upped the RAM to 32MB (a 19 percent improvement). With the Compaq P-100, the shading process took 67 seconds with 16MB and 48 seconds with 32MB (a 28 percent boost).

TEST REPORT

Faster Multimedia

Intel's upgrades are the choice for boosting MMX software.



[1]Results for the Evergreen MxPro-233 and 200-MHz Intel MMX OverDrive are based on prerelease versions of the chips.

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DO IT YOURSELF?

OF COURSE, KNOWING you want an extra 16MB of RAM is different from actually acquiring it. Memory comes in so many different flavors these days that figuring out which kind you need is far from a trivial matter. How much? SIMMs or DIMMs? 32-pin versus 72-pin? 60 or 70 nanoseconds? And how many open memory slots does the PC have, anyway?

This stuff isn't impossible to figure out. Even if you're not Ms. or Mr. Memory, you can always open the case, shine a flashlight inside to check out the situation, and place a call to a reputable vendor. If you tell them your PC's brand name and model, they should be able to send you the correct memory modules. Or, if you know of a good computer store, you could take your PC there, and an expert should be able to install the correct memory properly.

Graphics Boards

NOW IT'S TIME to talk about those enhancement upgrades—the ones that won't turn your computer into a speedster, but will help you do more with what you've got. The first place to start is your graphics subsystem. ▶

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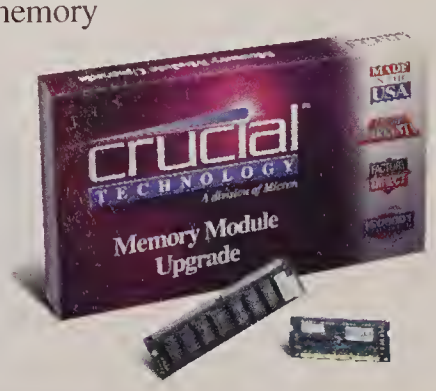

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Circle 56 on reader service card

the moon, late 1960's

my, my,

how things have

changed.

mars, late 1990's

corolla, 1968

corolla, 1998

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Circle 219 on reader service card

Before Upgrading, Make a Safety Net

MOST UPGRADES are easy and uneventful: Adding a new drive or beefing up your RAM is usually a relatively trivial task. But every once in a while, probably due to tachyon leakage from the warp nacelles, you will suddenly find yourself up the creek without the well-known marine propulsion unit.

Fortunately, taking a few simple precautions can prevent full-blown upgrade disasters. Before you go under the hood, build a safety net.

- Go to the Add-Remove Programs applet in the Control Panel, click on *Startup Disk,* and make a set of bootable Emergency Startup floppies.
- Do a full hard disk backup (including the Registry), and make sure the software necessary to restore that backup is installed on your Emergency Startup disks.
- Run your system setup utility and write down all the drive and memory data that's listed in the CMOS: cylinders, landing zones, all that stuff. This is especially important if you have an older motherboard that doesn't understand how to do Plug and Play. A catastrophic installation failure may trash the CMOS where this information is stored. Plug and Play motherboards should be able to query your hardware and restore this data automatically, but it won't hurt to have a written record.
- Run Control Panel and step through the various applets, noting settings for Display, Keyboard, Mouse, Network, and Sounds, and all the settings (especially IRQ and DMA assignments) listed under the System Device Manager.
- Copy your Startup files (such as autoexec.bat and config.sys) to a floppy.
- Read any and all manuals—for your system, upgrade kit, graphics card, CD-ROM drive kit, you name it. Write down tech support numbers so they're easy to find.

- Turn off the PC's power before you open the case. Ground yourself to avoid static electricity discharges.
- If you have an instant camera, open the PC's case and snap a few close-ups of the cabling, boards, and drives before you disconnect anything. If you don't have the camera, draw a sketch.
- Label any cables you need to remove so you'll know where to reconnect them.
- Be sure to note how the cables in your PC are oriented. SCSI cables are usually keyed so they connect only in the right position, but many other types of cables can be accidentally reversed. Look for a colored stripe on the cable and make a sketch showing how it was oriented to the connector.
- If possible, do the upgrade during regular working hours to ensure that your vendor's support staff is available on the phone in case of trouble.
- Finally, never, ever screw the PC's case back on before you test the upgrade; this is a surefire way to guarantee that something will go wrong.

Who needs to upgrade their graphics board? Anyone with a puny 1MB of video RAM, that's who. Dismayingly, 1MB of video RAM was common in the first P-75 and P-100 PCs that were sold—especially in home models. The problem is, video processors can crunch more graphics data than 1MB of video RAM can send them. This means that when you have only 1MB on your graphics card, your graphics aren't going as fast as they could. If you're not sure how much memory is on your graphics card, call your system vendor and ask.

Both the Gateway P-75 and the Compaq P-100 that we tested started out with 1MB of video RAM. In informal testing, we upgraded the Compaq P-100 with a $199 Matrox Millennium II with 4MB of memory and found the performance boost to be just slightly better than adding 16MB of system RAM—approximately 4 percent. Of course, $199 for a new graphics board is a lot more than you'd spend on 16MB of RAM. But the reason for upgrading your graphics board often has more to do with what you do than how fast you do it.

FOR THE WAY YOU WORK

IF YOU USE your PC primarily for word processing, spreadsheets, and browsing the Web, any graphics board with 2MB of video RAM will do. You may already have one in your PCI slot. Most current video boards can handle all the resolutions and refresh rates you'll need for running common business software.

If you run a desktop publishing shop, spend a lot of time editing photos, or use a large 17- or 19-inch monitor, memorize this number: 4MB. For effective image editing you need to see 16.8 million colors at high resolutions. And to see photorealistic color at 1024 by 768—a good resolution for a 17-inch monitor—you need a 4MB card.

Finally, even a slight video flicker will tire your eyes over time. Since graphics professionals spend long hours poring over fine details on big monitors in high resolution, they need rock-solid refresh rates to reduce flicker. Two hardware functions determine refresh rate: the ▶

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type of memory on your video card (you need VRAM, WRAM, or SGRAM) and the speed of the on-board RAMDAC processor (you should look for at least 175 MHz).

Add it up, look at the bottom line, and you'll find our two recommended video boards for graphics pros. ATI's $219 3D Pro Turbo PC2TV is one of the most appealing choices in our current Top 10 Graphics Boards. With 8MB of on-board video RAM, it outperforms virtually every rival on graphically demanding applications. Or look at the Matrox Millennium II; it's among the fastest boards we've tested, and it costs under $200.

GAMES PEOPLE PLAY

RIGHT NOW 3D is probably the main reason for upgrading your graphics board. And while you can't buy a new video board that *doesn't* include 3D, very few deliver impressive results. And 3D really comes down to one question: How good does it look?

Some guidelines do exist. For instance, you need at least 4MB of video RAM because texture maps, which make bricks look like bricks and wood look like wood, must be stored in video memory. You should probably look for a board with a separate 3D chip set, not one with some 3D functions bolted onto a 2D chip set. And remember, if most of your software and games aren't written to harness the chip's 3D features, you're wasting money.

Of all the boards we've tested, there are two we like for their ability to run 3D software. The $249 Hercules Stingray 128/3D comes with 6MB of video RAM and a separate 3D chip set, and it boasts some of the highest frame rates in our game tests. Most important, the quality of its 3D images is the best we've seen. We also like the new STB Velocity 128 3D. It's the best board we've encountered that actually combines 2D and 3D into one chip—and a 4MB version costs just $199.

3D may be the reason to upgrade your graphics board, but few deliver results.

Hard Drives

WE'VE NEVER met anyone who didn't think they needed a bigger hard disk. And the funny thing is that everyone *does* need a bigger hard drive—data always expands to fill most of whatever storage space you have.

Fortunately, hard drives just keep getting bigger—and cheaper. While high rollers wait for new 8.3GB units from IBM and Quantum, the rest of us can still score high-performance 4.3GB hard drives for well under $300. Performance is terrific, reliability is great, and the average cost per megabyte is free-falling below 15 cents.

Even though disk access remains one of the worst computing bottlenecks, you shouldn't count on seeing more than a slight performance improvement in your computer just from upgrading your hard drive, unless you have a medieval model—540MB, say, or smaller.

Nonetheless, a new hard disk should make for a hefty speed-up in your personal performance: Instead of worrying about where to install new software, or losing precious time moving old files off your overloaded disk to make room for new ones, you can forget about the drive and concentrate on working. Nice!

IDE OR SCSI?

IF, LIKE MOST OF US, you spend most of your computing time doing common home and business tasks, you'll be perfectly happy with an IDE hard disk. SCSI units are a bit faster, but IDEs are cheaper, easier to install, and very reliable.

On the other hand, if your work requires lots of disk access and you make your living doing desktop publishing, heavy-duty multimedia, high-end graphics manipulation, or image editing, then you'll see a noticeable performance improvement from a SCSI drive. But there's a catch: To get that last ounce of speed you'll need to install a good SCSI card into your PC—and that can cost an additional $250 above whatever you spend for the drive itself.

We took a close look at the latest bunch of IDE hard drives in April (see "Hard Disks for Bargain Hunters"), and nothing we've seen since has changed our minds about the two Best Buys we listed in that article.

Seagate's 2.4GB Medalist Pro 2520 costs $290 on the street. Western Digital's 2.5GB Caviar drive, which replaces the 2.1GB version, runs $200. Our tests didn't find many performance differences between the Medalist and Caviar, and both led the pack on technical support and ease of installation. They also come with great manuals and first-rate installation software; if it takes you much more than an hour to install either one, you probably stopped for lunch. ▶

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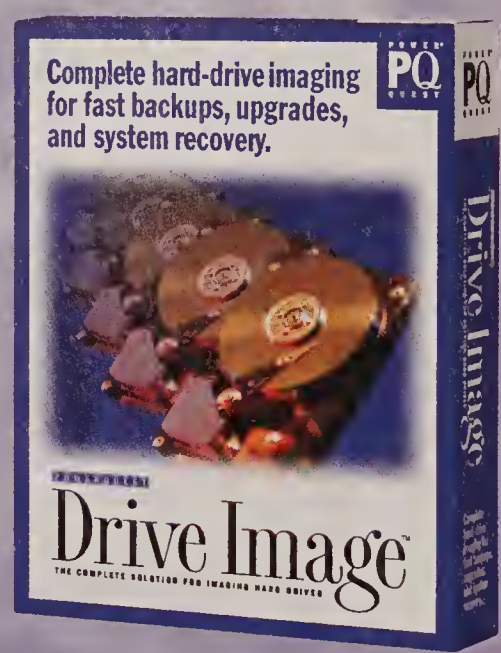

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CD-ROM Drives

IF YOU SUSPECT that your CD-ROM drive is slowing you down, you're probably right. And if you're using anything pokier than a 8X drive you're *definitely* right! For technical reasons, sucking data off a CD-ROM and into your system is inherently slow.

But these days upgraders are looking at a win-win scenario. Not only do the latest multispin drives do the job much faster, but you don't need to drop a bundle of money to get one. In fact, it's hard to spend more than $300 unless you're looking for a DVD-ROM package.

HOW MANY X'S IN SEXY?

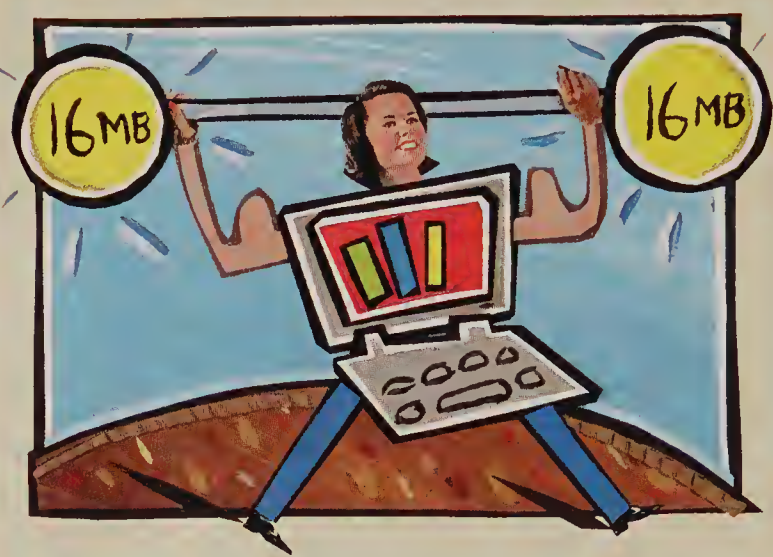
IF MAKING THE DECISION to upgrade your slower-than-8X CD-ROM drive is easy, figuring out the sexiest drive to upgrade to is not. For one thing, it turns out that a 24X drive won't necessarily run your applications twice as fast as a 12X drive.

The applications you use will have a big impact on how much your performance can improve. If you mainly use your CD-ROM drive to run multimedia clips in Encarta, you won't see much difference. Most multimedia vendors master their products to the lowest common denominator so they won't have a lot of returns from angry people with older drives. That means video comes off a 2X or 4X drive about as well as it will on anything faster. Where you *will* see performance benefits are in software installation, accessing databases, and copying big graphics files off the CD-ROM.

The newest drives out of the box rated are at 24X. Should you care? Not according to our tests. In most real-life situations, that number is more fantasy than reality. If a disc is even slightly out of balance—if, for instance, it physically has more ink on one side than on the other—and you spin it faster than 12X, it will start vibrating. When that happens, most CD-ROM drives automatically downshift to 4X. A few high-end drives, like the Plextor, can handle more vibration and won't go below 12X. In most cases, though, you won't see much benefit from pushing past 12X speed, however cool it sounds.

AGAIN, IDE OR SCSI?

FOR MOST OF OUR READERS, who run unexotic home or business applications, an IDE CD-ROM drive is fine. As with hard disks, SCSI is faster, but IDE is both easier to install and cheaper—and you don't need ▶



Yes, Virginia, You *Can* Upgrade a Notebook

FOR YEARS, upgrading a notebook was almost impossible. Even now, as a few upgrade paths begin to open, it's still a dicey proposition. For one thing, notebook hard drives are usually mounted in proprietary cases. Until very recently, if your notebook vendor didn't offer a bigger hard disk or a faster CD-ROM drive as a standard upgrade, you were out of luck. And swapping up to a faster CPU was virtually unthinkable.

■ **Upgrade the memory.** If you use a notebook, though, you're probably accustomed to overcoming obstacles—like convincing the airport security staff your portable PC isn't a bomb. Memory upgrades are straightforward. They cost more than their desktop counterparts (16MB goes for $100 to $150) and are usually made to go with specific machines. Memory companies such as Kingston carry upgrades for most notebooks, but you should call both the RAM vendor and your portable's maker to ensure that the memory will work properly. Once you've got the RAM, just slip it into the upgrade socket.

■ **Upgrade the hard drive.** Internal hard drive upgrades are getting easier, too, largely because engineers are making the original notebook drives easier to swap in and out. For instance, a company called CMS Peripherals offers four different do-it-yourself notebook hard drive upgrades—but they're not cheap. A 1GB Easy-Plug Easy-Go unit sells for $476, and the top-of-the-line 3GB drive will set you back a cool $1235. CMS says these upgrades work with notebooks from most major vendors. The drives are designed so you can install them yourself, and a CMS spokesperson claims that in most cases your notebook's warranty will not be voided. Some notebook makers disagree, so check before doing any upgrade to see how it affects your warranty.

■ **Ship it.** Until recently, notebook CPU upgrades were out of the question, but even that is changing. If you're still using a 486 notebook and don't mind mailing it in to Evergreen (along with $400 or so), the company says it will send the notebook back in one week with a brand-new Advanced Micro Devices 5x86/133 CPU that it claims runs like a Pentium-75. Invest another $300, and Evergreen will also swap you up to a 1GB hard drive and copy over all your software. (Bigger drives are available as well.) Not every 486 will take the CPU upgrade, so call ahead.

• **CMS Peripherals,** 800/327-5773, www.cmsperipheralsinc.com

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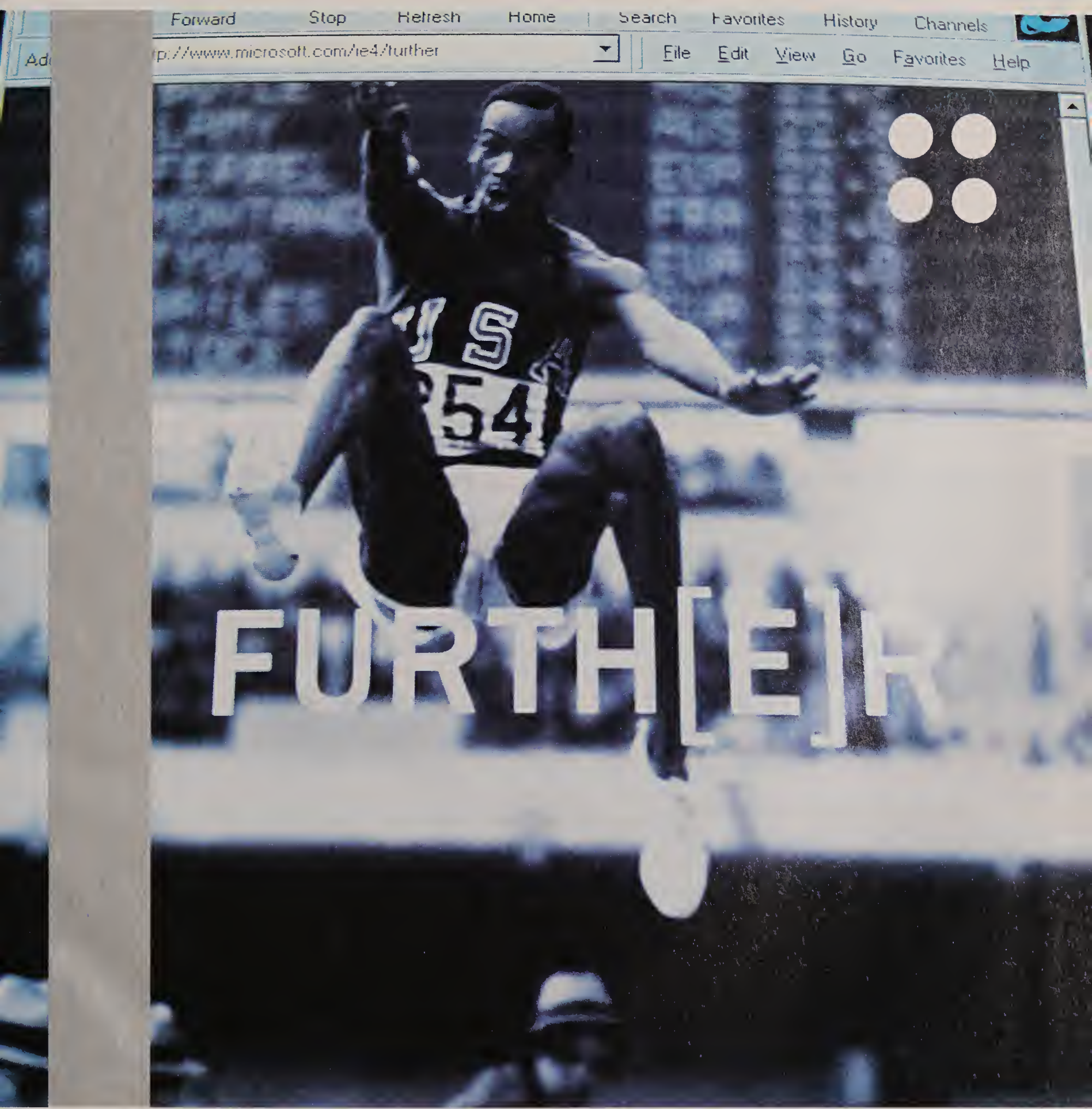
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to buy a SCSI interface board, either.

But: Do you make your living accessing a CD-ROM database? Do you run a lot of searches on a phone directory or reference disc? Are you a fanatical gamer who runs games from the CD-ROM? Answer yes to any of the above and you are a likely candidate for a SCSI CD-ROM drive. Just remember, our tests prove that the SCSI adapter has at least as much impact on performance as the drive itself. Hook a state-of-the-art SCSI drive to a cheap SCSI adapter and it will run no faster than an IDE drive. If you want top performance you'll probably have to spend $250 and up for a good bus-mastering PCI adapter.

In our July CD-ROM drive review ("12X, 16X, 18X: The Fastest Drives Alive"), we chose two Best Buys. Teac's 12X IDE unit, the CD-512E, is a fine performer at an amazingly low $149 price. Plextor's 12X SCSI drive, the 12PleX PX-12Csi, is blazingly fast—but it's much pricier at $269, and for best performance you'll need to pay extra for a SCSI adapter.

TO DVD OR NOT TO DVD?

SHOULD YOU run out and buy a DVD-ROM drive? No. Should you put off buying a new CD-ROM drive until DVD-ROM prices drop? Probably not.

DVD players are still quite expensive, and we don't expect prices to fall below $300 any time soon. For one thing, you can't buy just the drive; if you want to run DVD movies and advanced games, you have to buy a package with an add-in board that decodes MPEG-2 video. At press time, the cheapest DVD-ROM upgrade on the market cost $500.

Nor are DVD-ROM drives particularly good at ordinary tasks. Vendors claim that DVD-ROM drives will read standard CD-ROMs about as quickly as an 8X CD-ROM unit, but our tests show the transfer rate to be closer to 4X. True, double-speed DVD-ROM drives are on the horizon, but they'll be *way* expensive.

The price of a DVD-ROM drive by itself may dip below $300 in the next six months—and such a drive has its appeal, despite the relatively slow transfer rate. Remember, a DVD-ROM holds seven times as much data as a CD-ROM. That means you can get the entire national phone directory on one disc instead of four, for much easier searching. But our advice is to sit tight. A lot more is going to happen with DVD-ROM over the next couple of years.

> Everyone wants better performance, just as they want better government.

Up the Glory Road

EVEN SO, YOU HAVE SOME choices to make right now. Deciding whether to wait, upgrade, or go for a new system is never easy. Better performance? Sure, everyone wants better performance, just as they want better government. But better performance, like better government, is a slippery concept. For some of us, it means searching a CD-ROM database as quickly as possible; for others, it means being able to load a hot new memory-hungry business app and run it at the highest efficiency.

You're the best judge of whether you need a performance upgrade or an enhancement upgrade. According to our tests, the right OverDrive processor and another 16MB of system RAM is the surest way to a quick performance boost. But enhancing by adding a new graphics board, say, might help you enjoy the excitement of new 3D games.

Whether you decide to go for a performance upgrade, an enhancement upgrade, or both, you'll find deals out there that make good sense and extend the life of your computer. The only bad news is that you won't be able to enjoy the crash and tinkle as your old PC smashes into a heap of silicon and steel at the bottom of the air shaft.

Michael Goodwin is a frequent contributor for PC World. *Performance tests conducted by Mike Salayko of the PC World Test Center.*

For more information about all products in this article, circle reader service number 907. ■

CPU upgrade kits

MxPro-233, $499 list; **PR-166,** $159 list; Evergreen; 541/757-0934; www.evertech.com
READER SERVICE NO. 708

125-MHz MMX OverDrive, $219 list; **166-MHz MMX OverDrive,** $219 list; **200-MHz MMX OverDrive,** $349 list; Intel; 800/538-3373; www.intel.com
READER SERVICE NO. 709

Graphics boards

ATI 3D Pro Turbo PC2TV, $219 street; ATI; 905/882-2600; www.atitech.ca
READER SERVICE NO. 710

Hercules Stingray 128/3D, $249 street; Hercules; 800/532-0600; www.hercules.com
READER SERVICE NO. 711

Matrox Millennium II, $199 street; Matrox; 800/361-1408; www.matrox.com/mga
READER SERVICE NO. 712

STB Velocity 128 3D, $199 street; STB; 888/234-8750; www.stb.com
READER SERVICE NO. 713

Hard drives

Seagate Medalist Pro 2520, $290 street; Seagate; 408/438-8111; www.seagate.com
READER SERVICE NO. 714

Western Digital Caviar 22100, $250 street; Western Digital; 714/932-4900; www.wdc.com
READER SERVICE NO. 715

CD-ROM drives

Plextor 12PleX PX-12Csi, $269 street; Plextor; 800/886-3935; www.plextor.com
READER SERVICE NO. 716

Teac CD-512E, $149 street; Teac; 213/726-0303, www.teac.com
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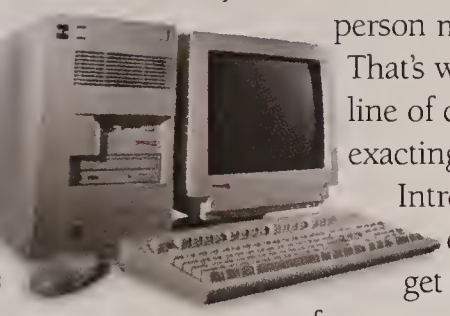

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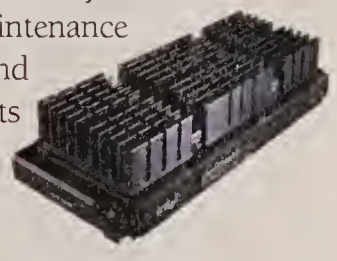

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Changing Channels

Will the Internet Become TV?

BY PETER LEWIS

Everyone from Microsoft to the cable industry is betting that you can't wait to get the Web on television. If you think there's nothing on TV now, just wait till you start getting the Internet.

THREE HUNDRED MILLION. No, that's not the amount of spare change sitting on Bill Gates's dresser, it's the estimated number of television sets in U.S. homes. And if Microsoft has its way, those TVs—not to mention telephones, stereos, and other consumer appliances—will be hooked together in a global network, running some future version of Windows.

Sound far-fetched? It isn't really. In the past year, Microsoft has spent an estimated $2.4 billion in an effort to conquer America's living rooms the same way it has dominated PCs. Just follow the ▶

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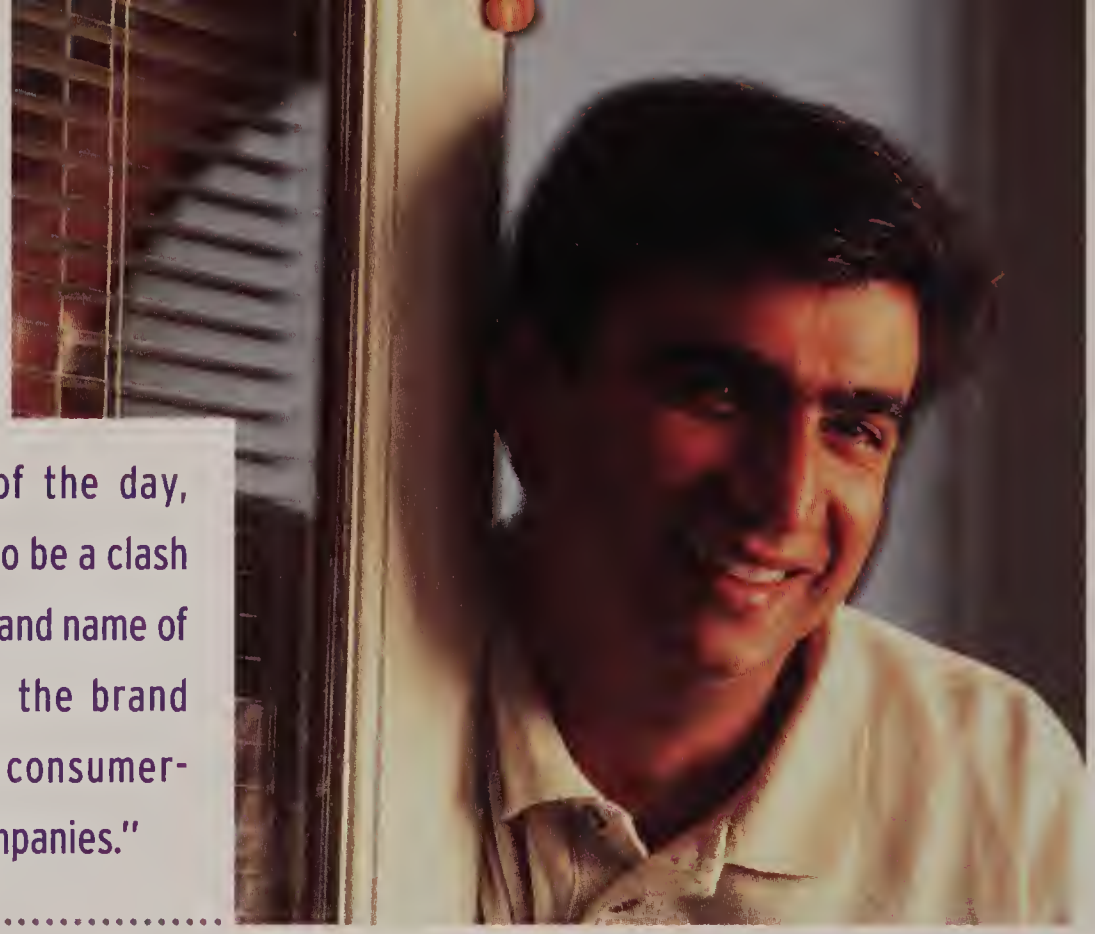
money: Microsoft recently spent $425 million to acquire WebTV Networks, creator of technology that lets you surf the Internet using your TV. Microsoft also forked over about $1 billion for a stake in cable TV company Comcast because it believes (and rightly so) that cable companies are likely to deliver new digital programming sooner than the broadcast networks. It swallowed up VXtreme and purchased minority stakes in VDOnet and Progressive Networks—companies that specialize in delivering audio and video over the Internet. (At press time, the Justice Department was investigating those three deals for possible antitrust issues.) There's even a rumor that Microsoft will use all or part of its $9 billion cash war chest to acquire a broadcast network.

The Redmond, Washington, software behemoth is hardly alone. Sun Microsystems, Oracle, and a host of consumer-electronics giants are vying to set the standards for Internet appliances. In the coming months, you'll see the first signs of how these efforts will change your PC, your TV, and the content you see on both.

Microsoft, its allies, and its rivals all are betting that millions of consumers who may never buy a PC will use "smart" consumer devices to interact with new forms of digital entertainment, as well as educa-



"At the end of the day, there is going to be a clash between the brand name of Microsoft and the brand names of big consumer-electronics companies."

Farid Dibachi General manager of consumer technologies for Sun.

Vying for Control The big three spend big to put the Net on your TV.

$60 Million

■ Sun spent an estimated $60 million to acquire Diba, a company that develops Web surfing technology for consumer-electronics devices.

SOURCE: Jupiter Communications

$2.4 Billion+

Microsoft's many investments include:

- $1.0 billion stake in cable TV company Comcast
- $500 million to develop online content for Microsoft Network
- $425 million to acquire WebTV Networks, creator of technology that lets you surf the Internet using your TV
- $400 million to develop broadcast content for MSNBC
- $75 million to acquire VXtreme
- $10 million to create CarPoint, Expedia, and other Web sites
- 10 percent stake in privately held Progressive Networks
- 5 percent stake in privately held VDOnet

SOURCES: Microsoft, Progressive Networks, the Meta Group, *PC World*

$60 Million

■ Oracle spent an estimated $60 million to purchase Navio Communications, a company originally formed by Netscape to create browsers for TV set-tops and other consumer appliances.

SOURCE: Jupiter Communications

PHOTOGRAPH: ROBERT HOLMGREN, INFOGRAPHIC: JEFF BERLIN

tional and commercial programming. The first such devices—so-called set-top boxes that let you access the Internet through your television set and a dial-up modem—are already here, and more are on the way (see "Report From the Living Room: The New Set-Top Boxes").

But these new Internet set-top boxes are just the tip of the proverbial iceberg. "The tip has emerged, and it's going to float a lot higher this year and next," says David Spenhoff, director of product marketing for the JavaSoft division of Sun Microsystems in Palo Alto, California. So you'll see new Internet access options, new program choices, and yes, new ways to sell you more stuff.

PLAYING SOON ON YOUR PC

MOST ANALYSTS predict that a decade from now, virtually all consumer devices will be eligible members of a digital networked community.

"In the same way that electricity changed our lives by transforming gramophones into stereos, iceboxes into refrigerators, and lanterns into lightbulbs, the Internet will revolutionize all of the devices we use—from our computers to our TVs to our telephones to our cars," says Wei Yen, president of NCI, an affiliate of Oracle in Redwood Shores, California. NCI, which recently merged with Navio Communications, is one of the companies racing to create software standards for future consumer devices.

Naturally, Microsoft contends that variations of Windows CE, the slimmed-down version of its flagship operating system, will be the best choice for the brains inside these devices. In fact, the new WebTV boxes have their own operating system with a bit of Windows CE running underneath. By doing this, Microsoft is encouraging software developers to write applications for its set tops, using Windows CE tools they already know. Small applications for the WebTV devices, as well as games and other home-oriented programs, are expected to ship this year.

It's a long way from the latest version of WebTV to Microsoft Icebox OS 4.0. But while Microsoft and other companies wait for the Internet appliance market to develop, they're quietly turning your home PC into something that looks more like a TV.

According to specifications proposed earlier this year by Intel, Microsoft, and Compaq—all of which have some clout in such matters—a year from now, most new home computers will have TV tuner cards that can receive digital television broadcasts. The companies say the tuner cards will add less than $50 to the price of a PC, and that cost will be absorbed in the normal erosion of PC pricing.

Microsoft is also adding TV-related features to its forthcoming Windows 98. Currently expected to ship in the second quarter of 1998, the operating system will have several new features that support "broadcast PC," including the ability ▶

Report From the Living Room

The New Set-Top Boxes

BY HARRY McCRACKEN

The marriage of television and the World Wide Web has prompted a rush to the altar by all sorts of corporate deal makers. But as for wooing you and me where we live—in our living rooms, to be precise—well, that's another story.

Until now, the lavishly promoted WebTV products have been just about the only option if you wanted a set-top box, a device that turns your TV set into a low-cost way to browse the Web and exchange e-mail with family members and friends. *PC World* reported on a flock of possible Internet-TV gizmos in October 1996 ("The Internet Meets the Couch Potato"), but more than a year later almost none of those products have actually arrived in stores.

Although many of the set-top products are still stuck in engineering labs, a few have finally made it out the door. This holiday season you'll find the first of them on store shelves. I was able to round up four devices: the original WebTV box and the improved WebTV Plus box that should ship in October, Curtis Mathes's uniView 210, and 8x8's ViaTV Model VC115. At press time the existing WebTV box and the Curtis Mathes and ViaTV models were shipping products; I tested a preproduction version of the WebTV Plus device.

(If you've seen one of WebTV's units up close, you know that the company—which is now part of Microsoft—runs the service that provides the content but licenses the hardware design to companies like Sony and Philips Magnavox. These companies actually sell WebTV using their respective brands.)

To try out the four gadgets in their natural habitat, I took them home, attached them to my 25-inch TV set, plopped into an easy chair, and went Web surfing, sometimes in the company of friends or family.

Set-Top Box Basics

INTERNET TV boxes have been touted as a way for grandparents and other folks who don't want or can't afford a PC to send and receive e-mail and browse the Web. The boxes sell for $200 to $600—much less than a low-end $999 PC—so it's no surprise they've got limitations. These gadgets don't offer such staples of PC-based Internet access as push news services like PointCast or multiplayer games. The ability to print isn't a given, either: WebTV offers it, but it's still in the works for the others.

Each box comes with its own Web browser, so you can't choose Netscape Navigator or Microsoft Internet Explorer as you would with a PC. The browsers you get are similar in basic design to their PC-based cousins. *(continued)*

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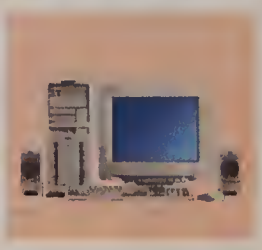

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to receive data transmissions along with broadcast video and audio.

And just as Microsoft added its Internet Explorer browser to Windows 95, it will put "Television Explorer" in Windows 98, according to Pierre deVries, director of advanced TV projects at Microsoft. The operating system will be able to gather information from a variety of online television programming guides—cable, broadcast, and satellite—and display it in a single grid on screen. This TV guide will let you do things your trusty paper listings can't: You'll be able to search all the programs by, say, an actor's name or a movie genre, and the guide may even help you program your VCR to record shows.

These new products will prepare your PC for upcoming changes to the material you see today both on TV and on the Web. The two types of content are invading each other's turf.

IT'S THE CONTENT, STUPID

TODAY, MOST OF US have little use for a TV tuner card in our PC. But that may soon change. Intel, Microsoft, Compaq, and Lucent Technologies have been pressing broadcasters to begin developing new types of entertainment and educational programming—"content," as they say in Silicon Valley—that blends video with interactive Web pages and electronic commerce. You've probably heard the standard examples: A football game where you can watch the game in one window while calling up player stats from a Web site in another; or an interactive version of *Seinfeld* that lets you chat with other fans online while watching the show.

But selling will be a big part of this story. In a particularly odious example, a screen might pop up saying, "Do you like Jerry's shirt? Order it now for only $39.95." Or: "Want to book an airline ticket to New York City to go on Kenny Kramer's unofficial *Seinfeld* tour? Click here!" For the truly masochistic, new streaming video technologies will enable you to watch 30-minute infomercials embedded in Web pages, and even rewind them and play them back.

These new types of digital content can be viewed on either PCs or TVs. But ▶

Report From the Living Room

(continued from page 169) But none of the boxes support all the technologies—such as Java and QuickTime—that are used in Web pages. So a site that's bursting with motion and audio on a PC may look static and silent on TV. E-mail is typically Spartan, with no attachments or fancy formatting. WebTV speaks of letting people send video and audio clips as e-mail attachments, but this feature wasn't available in time for my tests.

All the devices here use a humble 33.6-kbps modem to connect to the Net except for WebTV's new boxes, which have a K56Flex 56-kbps modem. The ViaTV box can connect through any standard Internet service provider account, but the uniView, WebTV, and WebTV Plus offer a proprietary service at $19.95 per month for unlimited access. WebTV and WebTV Plus let you optionally dial in through an ordinary ISP account, but in that case you'll still have to pay an extra $9.95 a month for the proprietary service.

The Verdict: What's Hot, What's Not

IS A SET-TOP BOX a sensible, affordable purchase for casual use—say, to check online news services or correspond with friends and family through e-mail, or for a family to browse the Web together? These gadgets are relatively inexpensive, but far from ideal.

Although it's true that all four boxes I tried are easier to use than a PC in some respects, they're not as simple as a microwave oven. Those who are intimidated by a VCR or an answering machine will need lots of help with a set-top box.

Web pages displayed on my TV tended to suffer from fuzzy text and blurry graphics; when I invited my dad over for some father-and-son surfing, he complained that tiny type and ornate graphics were hard to make out from his chair, some 6 feet away from the television set. (I didn't let on that I had similar troubles, despite my relatively youthful eyeballs.) If you're fortunate enough to have a fairly new TV with an S-Video jack—for a special high-quality video technology used in some VCR sets—you'll find that the WebTV and WebTV Plus boxes produce reasonably crisp, readable content, although some color combinations still cause the display to look blotchy.

Then there's the mousetrap. Most Web sites are designed to be navigated via keyboard and mouse, but these boxes substitute controllers—usually TV-style infrared remotes or, in the case of the ViaTV, your telephone's keypad. So while it's possible to click your way through hyperlinks, trying to type text (such as e-mail or URLs) is not fun; the infrared wireless keyboards sold as options (typically for $80 to $90 extra) are really necessities. *(continued)*

SET-TOP BOXES SUCH AS UNIVIEW, at right, display less text than a PC-based browser, left, and can't handle some elements at all.

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this doesn't mean that the Web sites you visit now will start looking like this week's episode of *E.R.*: It's more likely that *E.R.* will add Internet elements.

WebTV, for example, is working with the producers of prime-time shows to create online content for owners of the new WebTV set-top boxes. A WebTV subscriber watching these shows will be able to use new picture-in-picture features to see the show and Web information at the same time—such as home pages for each show, with e-mail addresses for stars; trivia; and scheduled online chats. Some of this content will be ready when the new WebTV boxes ship in October; more will roll out during 1998. Television shows will feature Web content this year, and the Web will have some TV content, but the two will not fully merge anytime soon.

Why not? For one thing, TVs and PCs will continue to occupy different rooms in many homes, says Mark R. Anderson, president of Technology Alliance Partners, which publishes the Strategic News Service in Friday Harbor, Washington. The "killer" digital TV applications will play on television's strengths—for example, taking Discovery Channel–type programs and making them more realistic and

Report From the Living Room

(continued from page 172) Infrared keyboards have the same limitations as your TV's remote control: You may have trouble if you sit at an angle from the box or if something or someone gets in the way.

On the bright side, these boxes are designed to get better. All four can upgrade themselves more or less automatically over the Internet, and their manufacturers intend to add new features at regular intervals. Among the four contenders I tried at home in September, the early winner looks to be the WebTV Plus box.

The New WebTV Debuts

ALL THE CLICHÉS about Internet time running at hyperspeed are true. After less than a year, WebTV has solved many fundamental problems that the others haven't and is moving on to new challenges.

In October and November, Mitsubishi, Philips Magnavox, and Sony plan to deliver set-top boxes based on the new WebTV Plus design. (Hitachi also plans to introduce one, but its schedule isn't firm.) Prices should range from $299 to $379. The original models from Sony and Philips will remain on the market, with prices slashed to about $200. (WebTV is further sweetening the deal with a $100 rebate that will bring the price for the original boxes down to $100 or so until sometime in January.)

For the sake of comparison, I used both a first-generation WebTV box and a preproduction version of the WebTV Plus *(continued)*

PHOTOGRAPH: FURNALD/GRAY PHOTOGRAPHY

Internet Set-Top Boxes What They Can and Can't Do

Today's set-top boxes provide basic Web access and e-mail features, but none support all Web multimedia technologies. The preproduction WebTV Plus looks the most promising, but if you don't want to make compromises, buy a low-end PC. Here's how the four boxes stack up.

PRODUCT	Manufacturer	Street price	Internet service charges	Can do	Can't do	Reader service number
uniView 210	Curtis Mathes, 800/864-8439, www.curtismathes.com	$399	$19.95/month; $14.95/year for TV-listings service.	This box's TV-listings service is a video junkie's delight.	Fuzzy display; difficult to use; Spartan Web browsing; no printing; keyboard not standard.	725
ViaTV Model VC115	8x8, 888/843-9898, www.viatv.com	$599	Choose your own ISP.	Only box with built-in videoconferencing; works with any ISP.	Fuzzy display; bare-bones browsing; you must use telephone keypad to navigate and input; can't print.	726
WebTV	Sony, 800/772-7669, www.sel.sony.com/sel/webtv; Philips Magnavox, 888/813-7069, www.magnavox.com/hottechnology/webtv/webtv.html	$200	$19.95/month, or $9.95/month for the WebTV service if you want to choose your own ISP.	Inexpensive, easier to set up and use compared to Curtis Mathes or 8x8 products, supports more types of Web content, allows printing, supports Secure Socket Layer encryption for online purchases.	Monthly service fee even if you use your own ISP; keyboard not standard; some TVs require $40 adapter; still not as easy to use as a VCR or microwave oven.	727
WebTV Plus	Sony; Philips Magnavox; Mitsubishi, 800/332-2119, www.mitsubishi.com	$299 to $379	Same as WebTV.	Adds TV listings, links between TV and the Web, and much more.	Many features won't be immediately available when product hits stores; some depend on broadcasters.	728
Typical $999 PC	Available from AST, Compaq, Monorail, and other companies.	$999	Choose your own ISP or online service.	Works with any browser; supports all Web features; runs thousands of other applications.	Subject to bugs, crashes, and other facts of PC life; costs $400 to $800 more.	729

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more interactive. Officials at Microsoft concur with the room theory. For detailed tasks that require your nose to be 18 inches from the screen, the computer is a better tool. For family or group viewing from a distance of 10 or more feet, the TV set is the right appliance.

THE NEW BANDWIDTH

THE REMAINING STUMBLING block is, of course, bandwidth. It's far easier to add small Internet elements to the broadband cable and satellite networks than to add huge amounts of video data to thin PC Internet connections. But here too, big changes are under way.

Broadcast companies recently won wide new swaths of the public airwaves for broadcasting high-resolution television signals. Exactly how broadcasters will use this spectrum remains unclear, but computer companies are lobbying them to adopt a strategy that would enable video and data transmissions to PCs as early as next year. That's well ahead of the arrival of the High Definition Television sets for which the bandwidth was allocated but which won't be available for years.

The main sticking point for broadcasters is whether to adopt the progressive scan system used by all computer monitors to display images on screen, or the interlace system now used by TV sets. If broadcasters don't back progressive scanning, the best-laid plans of the computer companies will be thwarted, unless the cable TV and satellite broadcast industries can be persuaded to come around.

Microsoft's $1 billion gamble with Comcast—which may be followed by other cable and satellite investments—is a way to influence the cable camp. Now that cable companies have recovered somewhat from their disastrous "interactive

> "In the same way that electricity transformed lanterns into lightbulbs, the Internet will revolutionize all the devices we use—from computers to cars."
>
> **Wei Yen** President of Oracle's NCI affiliate in Redwood Shores, California.

Gateway 2000 Thinks Big

The Newest Destination PC/TV

Author Harry McCracken checks out Gateway's Destination Big Screen PC/TV.

GATEWAY 2000 PIONEERED a new kind of PC in April 1996: A system that doubles as a big-screen home theater TV for your living room. That model had some problems. But I just tested the newest Destination, and it stands out in a crowd of look-alike home PCs.

I used the Destination Big Screen PC/TV D6-300XL, the top-of-the-line configuration that sells for an intimidating $4699. That's more than most of us would ever pay for a home system, but then not everyone craves this much PC. The charcoal-black unit includes a 300-MHz Pentium II processor; 64MB of RAM; a 31-inch display; a 6.4GB hard disk; a DVD-ROM drive; a TV tuner; a surround-sound stereo speaker system with AM/FM receiver; a 56-kbps modem; a 4MB Apocalypse 3Dx graphics accelerator; and a built-in photo scanner. Less-costly configurations that include the jumbo screen and DVD-ROM drive begin at $2699.

(Compaq, still the only vendor that has followed Gateway into this market, couldn't provide us with one of its newest PC Home Theatres, shipping in November with DVD-ROM, in time for this review.)

Before you start coveting the Destination, make sure you have plenty of space for it. The monitor alone weighs 140 pounds; it took the best efforts of two muscle-bound movers to squeeze it into my apartment and hoist it

PHOTOGRAPHS: FURNALD/GRAY PHOTOGRAPHY

television" trials in the early 1990s, most are once again interested in home PC users. They'll be competing to bring high-speed video, voice, and data services to the home through fiber, coaxial cable, satellite, and digital subscriber line telephone services.

The relationship between Microsoft and the broadcasters will be in a state of flux for a while. Microsoft can reap vast new revenues if it becomes a content provider of digital programming, and it seems to have every intention of doing so. It has spent hundreds of millions of dollars on expanding programming for its online Microsoft Network and the MSNBC television channel, as well as on developing online consumer services like the Car Point automobile-shopping service and the Expedia travel site. At the same time, the company is working with broadcasters to develop additional content for existing television shows. Microsoft is ▶

onto a TV stand. I spent most of an afternoon connecting cables and arranging the six Harmon Kardon speakers. But when everything was set up, the Destination was easy to like (and impossible to ignore).

As a game machine, it's hard to beat. With the big screen and booming sound, even unassuming games take on an epic quality. The handful of available DVD movies include almost none that I want to watch, but I was impressed by the new discs' picture and audio quality. The Destination comes with four games, some family titles, Microsoft Works, and a coupon for one free movie on DVD from Warner Bros.

Some of the defects of set-top boxes—fuzzy displays and cumbersome input devices—aren't an issue here. The screen is sharp and easy to read at a distance, and it doubles as a television set with adequate (but not outstanding) picture quality.

The full-size wireless keyboard has a built-in touchpad instead of a mouse; unfortunately for southpaws like me, it's located to the right of the keys. A smaller remote control with a marble-size trackball works nicely for action games and applications that don't require typing. Both devices use radio-frequency technology rather than infrared, so they work well from anywhere in the room.

Ultimately, the Destination makes the most sense as a (well-heeled) family's second PC. After all, there will be times when one family member needs to compute while another wants to watch TV. Some tasks demand privacy—say, composing a love letter or paying an overdue bill—and can't be carried out discreetly on that 31-inch screen. And is there any way to blend a printer and external tape backup drive into a living room's decor? Not in my living room.

Here's a final tip. If you do invite the Destination into your home, be careful with Quicken. It made a graph of my credit card balance look like the national debt. —H. M.

Before you start coveting the Destination, make sure you have plenty of room for it. The 31-inch monitor alone weighs 140 pounds.

Destination Big Screen PC/TV D6-300XL

Gateway 2000; 800/847-5257; www.gateway.com **Price as tested:** $4699

READER SERVICE NO. 776

Report From the Living Room

(continued from page 174) unit. Hands down, both boxes provided a richer Web experience than I had using the Curtis Mathes and 8x8 boxes. WebTV doesn't support Java or ActiveX, but it handles RealAudio broadcasts, MIDI music, and Macromedia Flash animations perfectly, and Usenet newsgroups and Internet Relay Chat discussion rooms are easy to use. Both new and old WebTV units also support Secure Socket Layer encryption, so I ordered a book from the Amazon.com Web site with relative confidence that my credit card information wouldn't be pilfered. The WebTV devices did the best jobs of squeezing Web pages onto my TV screen, reducing the need for excessive scrolling, and they also perform a number of clever tricks to make exploring the Web more inviting. For instance, they determined the correct access number for my area automatically, configured themselves appropriately, then presented me with a hometown weather report and other local news each time I logged onto the Internet.

Connected to a television with an S-Video jack, the WebTV image is surprisingly easy on the eyes. If your TV lacks that jack, some pages will look as fuzzy as a mohair sweater, as they do with the competing boxes. The set-top's TV-style wireless remote was the best of a bad lot for cruising from link to link, but using it to tap out text on the on-screen keyboard quickly became mind-numbing.

Mitsubishi is doing its customers a favor by bundling a wireless alphanumeric keyboard; it's an $80 option for all Sony and Philips Magnavox units.

Unlike the first-generation WebTV boxes, the new devices include a 1GB hard disk and can receive Web pages and other data broadcast by a cable television system. This information arrives interleaved with the television signal or hidden in closed-captioned information. What does this capability make possible? For starters, WebTV says it plans to transmit hundreds of megabytes' worth of popular Web sites and high-quality video clips via cable and broadcast TV at night. So a WebTV Plus box will be able to silently grab pages and clips of interest from that data stream and store them on its hard drive. You could then browse through them the next day, without having to wait for them to download through a modem. But this feature won't be ready right away; as I worked with the early prototype, *(continued)*

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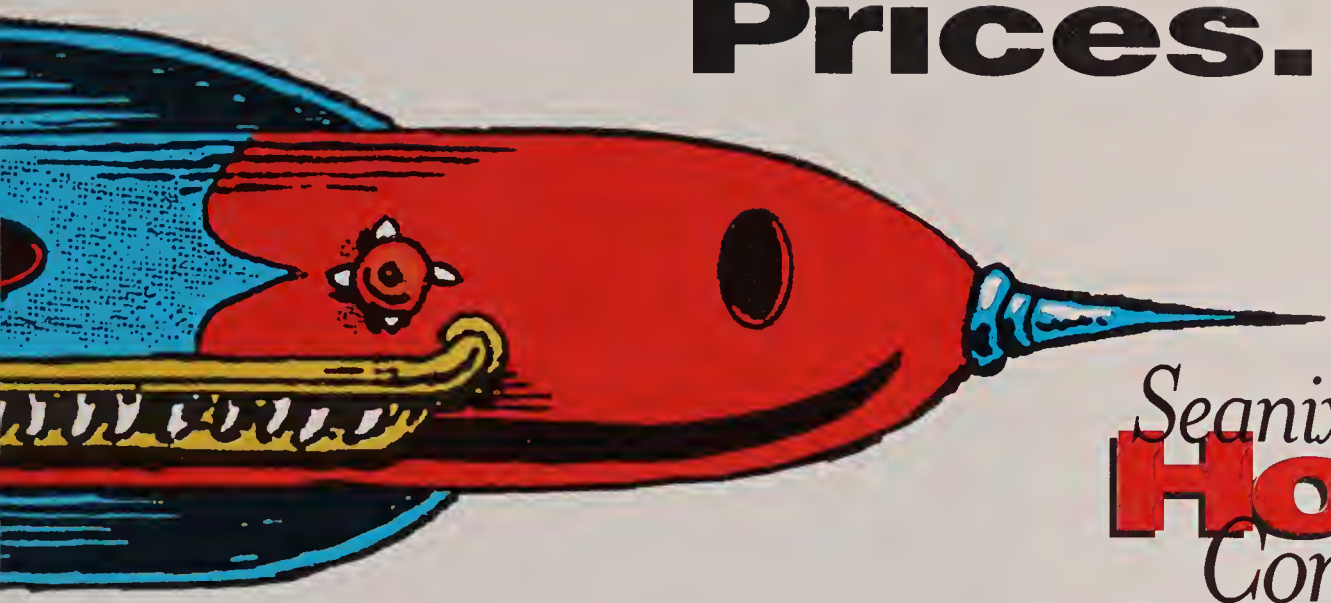

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positioning itself to shape hardware, software, *and* content in this new arena.

"They're just playing a roulette wheel and putting bets on all the numbers," says analyst Adam Schoenfeld of Jupiter Communications, a research firm in New York City. "They're making sure they will be a player, wherever the market goes."

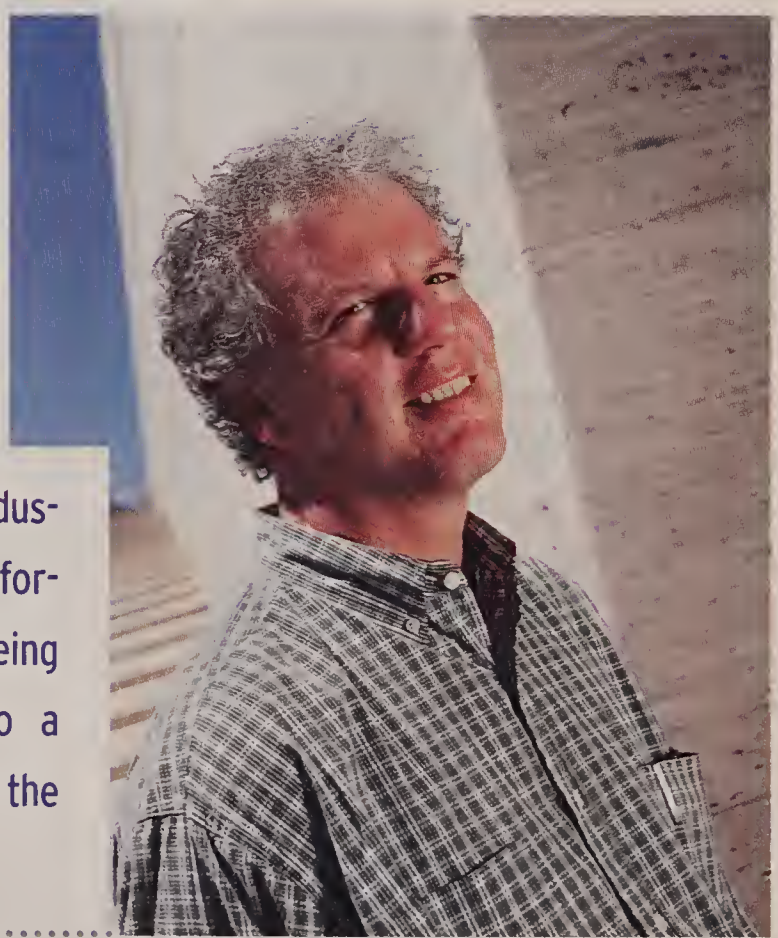
SUN AND ORACLE WEIGH IN

WILL ANYONE be able to compete with Microsoft? Sun and Oracle certainly have the power to try. In a deal whose worth Jupiter Communications estimates at about $60 million, Sun recently acquired Diba, a company in Menlo Park, California. Diba develops software and technologies to be licensed to consumer-electronics companies for new digital devices—from telephones to set-top boxes to TVs.

Farid Dibachi, general manager of consumer technologies for Sun Microelectronics, is optimistic about Sun's chances for success. "Microsoft wants to own everything, from soup to nuts, plus content," he says. "The big difference between us and them is that we provide enabling technologies. At the end of the day, there is going to be a clash between the brand name of Microsoft and the brand names of big consumer-electronics companies."

For its part, Sun is promoting its own Java language as the "write once, run anywhere" brains for operating the consumer appliances. Sun asserts that Java, more than Windows CE, will enable creative solutions for controlling new ▶

"The new media industry of electronic information is rapidly being transformed into a digitized version of the old media."



Gary Chapman Director of the 21st Century Project, University of Texas.

Report From the Living Room

(continued from page 179) the WebTV people couldn't predict when these nightly broadcasts would begin.

WebTV also plans to use the disk to store programs—games, at first, and eventually other types as well. And Microsoft intends to offer some form of Windows CE for the box, although it won't have a Windows-style user interface.

The new design can also slice and dice TV and PC information and merge it on screen. WebTV executives speak of blending Web and TV content in new ways: commercials that let you jump to a Web site by clicking an icon, news programs that include interactive polls, and "enhanced" sitcoms that let you chatter with fellow fans while you watch.

Most of these features won't be ready when WebTV Plus debuts. They'll be rolled out over time, and some are dependent on broadcasters' offerings. WebTV had signed agreements with Warner Brothers, E! Online, the Discovery Channel, and PBS. One game, Berkeley Systems' You Don't Know Jack, will be standard.

For now, the new box's biggest enhancement is a slick TV-schedule feature; it displayed upcoming programming choices on the bottom of the screen as I channel-surfed. Its picture-in-picture feature let me keep one eye on a small TV image while my other eye checked out a Web site.

WebTV Plus could be the most intriguing blend of TV and Web yet, but it's too early to pass final judgment. For basic Web surfing and e-mail, the original WebTV model is adequate, but the newer model should be worth the extra $100 to $280, if even half the planned features become reality. While other units try to outdo WebTV with unique features (such as ViaTV's videoconferencing), the WebTV products come closest to delivering high-fidelity Web in an easy-to-use form, and at the lowest cost.

uniView: Box of All Trades

CURTIS MATHES'S uniView 210, a $399 set-top box, claims to do everything short of making julienne fries. Besides letting you browse the Web, it also attempts—to greater or lesser degrees—to be an electronic television guide, a speakerphone, a universal remote control, a fax machine, and a personal organizer. Whew.

The problem is, it doesn't do most jobs well at this point. Exploring the Web with the uniView is much less satisfying and straightforward than with the WebTV units, mostly because its bare-bones browser frequently reformats pages in ways that make them tough to navigate. I often had to scroll around a page both vertically and horizontally, and the browser can't handle RealAudio or SSL transactions.

In contrast to WebTV's reasonably simple user interface, the uniView also suffers from a jumbled interface that mixes on-screen menus and remote control buttons in ways that are hard to predict and even harder to remember. At least the remote has a full (though non-QWERTY) set of alphanumeric keys, which makes typing Web addresses and e-mail a little less painful than with on-screen keyboards. Still, consider the $90 wireless keyboard mandatory for all but the most casual use.

As for the other functions, there's less there than meets the eye. There's a credit card swiper, but for now you can use it only to pay for the uniView service itself. The printer port isn't yet functional. Even features that do work take patience: I had to call Curtis Mathes's tech support to find out why my sister couldn't hear me when I called her on the speakerphone. (It turned out that the box arrived with the phone volume set to zero, and it can be adjusted only after you initiate a call.) The one *(continued)*

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generations of low-cost, low-power smart devices. According to Sun, if consumers have to reach the Net by using a powerful Pentium-based PC running Windows, the technology has failed.

Last August Oracle completed its purchase of Navio Communications, a company previously owned by Netscape that is creating browsers for set-top boxes and other consumer appliances. Navio has been folded into Oracle's Network Computer group, in a deal that analysts estimate was also worth about $60 million. At press time, several consumer-electronics vendors, including RCA and Zenith, were working on consumer products using the Oracle technology.

THE NET RESULTS

IT'S TOO SOON to evaluate which company's product plans look the most promising. But it is clear that by this time next year, many people will own home PCs with more TV capabilities, and more consumers will be surfing the Web using devices other than their computers. While the new WebTV device—the best-looking of the current set-top boxes—is basic at best, Microsoft plans to upgrade the WebTV service over the course of 1998.

These changes will surely influence new content. Will they lead to smarter television, or will they merely help to dumb down the Internet? Benefits as well as perils await in the evolving digital arena.

"Television right now is purely dumb," says Strategic News Service's Anderson. "TV is top-down, broadcast, shut up and listen, I'm going to show you what you see. That's all going to change. The power will shift from broadcasters to customers, and that's already under way. There will be more networks and more kinds of information available, because people will be exercising choice."

Gary Chapman, director of the 21st Century Project at the University of Texas at Austin, takes a less optimistic view. "The new media industry of electronic information is rapidly being transformed into a digitized version of the old media, dominated by the same corporate giants and purveying the same mass-market, middle-of-the-road mush," he says.

And so the technology soap opera plays on. Will PCs define the future of broadcasting? Can Sun and Oracle thwart Microsoft's plans for domination? Will we start hearing, "Honey, answer the TV, will you? I'm watching the telephone"?

For the answers, tune in next year—PC or TV, it's your choice.

Freelance writer Peter Lewis lives in a three-television house in Austin, Texas. Harry McCracken is a senior writer for PC World *in Boston.* ■

Report From the Living Room

(continued from page 182) feature that is truly a success—a supercharged TV-listings service—costs an extra $14.95 per year. You can view titles and plots as you surf channels, or search for shows by keyword. It's perfect for video junkies who want to plan their week.

Curtis Mathes does have big plans for the uniView, including an online banking service and compatibility with Java applets. (This box has a hard disk, but doesn't do much with it.)

ViaTV VC115 and VC55

The company also intends to build the same technology into big-screen TVs next year. I'd wait to see what the future holds before plunking down my money for this product.

Something Different: ViaTV

ABOUT THE SIZE of a large brick, 8x8's $599 ViaTV Model VC115 looks nothing like the other Internet set-top boxes. That's because this box is a videoconferencing device first and a Web browser second.

Videoconferencing? Yes, the VC115 can place and receive video calls over an ordinary phone line. It uses the H.324 standard that's widely supported by PC-based videoconferencing systems, so you can call people that have camera-equipped PCs or ViaTV units. A $399 version, the Model VC55, lacks a built-in camera—you'll have to plug in your own camcorder.

Although the VC115's camera can pan and zoom, I felt most comfortable shoving an armchair within a couple of feet of the TV screen and carefully framing myself within the camera's view. And as with PC-based packages, the image looked blocky and artificial. Still, video calls are easy to make—fine for long-distance communications with family or friends.

As an Internet TV box, the best thing about the ViaTV is that it works with any ISP account. That's attractive if you live out in the boonies and can't reach the WebTV or uniView networks with a local call, or if you're already paying for an ISP account to use with a PC. But the ViaTV's browser doesn't do any better than the uniView's: Pages can be tough to scroll through, and because only basic Web technologies are currently supported, sites have a spare look and feel.

Worse, you roam the Web with your phone's keypad, nudging around an on-screen cursor (the 2 key moves it up, the 4 key moves it to the left, and so forth). It took me more than a minute to type a simple Web address this way. 8x8 sells a wireless keyboard for $79; buy it to preserve your sanity.

8x8 plans to pump up ViaTV with features such as RealAudio and printer support, and the ability to place video calls over the Internet (it currently works only with modem-to-modem calls). But for now, video calls are the main attraction.

At press time, it appeared that a few more devices could appear by the holidays, including a $300 box from RCA, based on Oracle's hardware design and software. Browser developer Diba also hopes that units based on its technology will ship from unspecified vendors. But none of them were ready to look at. Stay tuned for more options throughout 1998. ■

PHOTOGRAPH BY DAVID PARKER

Is lack of support ending your infatuation with your current P.C.?

MMX™
intel inside
pentium® II PROCESSOR

Well here's living proof customers just love Quantex.

Nothing sours a romance with your PC faster than costly repairs and lousy tech support. That's why Quantex builds its PC's to last. But if anything should ever go wrong, we make sure you get your PC working again in no time at all. We even provide 24 x 7 tech support from live experts. If you need any proof of this, just check out what a recent survey says about our ability to handle any kind of problem quickly and inexpensively. And think of all the money you'll save on broken glass!

Overall Rankings

PC VENDOR	GRADE
Quantex	Excellent
Dell	
Hewlett-Packard	
IBM	
Compaq	Good
Gateway 2000	
Micron	
NEC	
Acer	Fair
AST	
Toshiba	
AT& T	Poor
Digital	
Packard Bell	

Windows Magazine, 8/97

Solving Problems

VENDOR	DAYS TO RESOLVE PROBLEMS
Quantex	11
IBM	12
Compaq	13
Dell	14
Hewlett-Packard	14
NEC	14
Acer	16
Micron	17
AST	17
AT& T	20
Gateway	21
Digital	27
Packard Bell	27
Toshiba	37

Windows Magazine, 8/97

Would You Buy Again?

VENDOR	% WHO WOULD BUY THE SAME BRAND
Dell	92%
Quantex	91%
Hewlett-Packard	89%
IBM	89%
Micron	81%
Gateway	80%
Acer	74%
AST	74%
NEC	71%
AT& T	69%
Digital	69%
Toshiba	61%
Compaq	58%
Packard Bell	51%

Windows Magazine, 8/97

"Quantex, making its debut in the desktop category, quickly resolves its callers' problems an impressive 47 percent of the time, compared with the survey average of 31 percent."

PC Magazine 7/97

"★★★★" Buy again based on service and support

PC World 6/97

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Quantex is proud to say that we are one of the last to introduce a notebook. Why? Because, unlike our competition, we waited until we could combine Intel Mobile Module (I.M.M.) Architecture, a 13.3" XGA Active Matrix screen and a 3GB removable hard drive with all the latest technologies for maximum versatility and expandability in a notebook.
Our new notebooks are the equal of the top performing desktops and backed with our acclaimed 24-hour 7-day live tech support. For further information check out our website: www.Quantex.com

PCI Bus with 128-Bit Graphics Accelerator

Intel Mobile Module (I.M.M.) architecture

233 MHz Pentium® Processor with MMX™ Technology

13.3" XGA Active Matrix Display

New! Intel 430 TX PCI Chipset

USB and Fast IR Ports

Quantex H 1331 $4499

Business lease: $146/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- Intel Mobile Module (I.M.M.) Architecture
- 13.3" XGA Active Matrix Display
- 64MB SDRAM(expandable to 144MB) / 512KB Pipelined Burst Cache
- 3GB HD / 3.5" 1.44MB Modular Floppy Drive
- PCMCIA 33.6k Fax/Modem
- 20X Max Modular CD-RDM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows '95
- MS Dffice '97 SBE
- Carrying Case
- 24-hr./7-day Technical Support
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

Quantex H Series

Standard Features ■ 3.5" 1.44 Modular Floppy Drive ■ 20X Max Modular CD-ROM Drive ■ PCI Bus w/128-bit graphics accelerator ■ Integrated 16-bit Stereo Sound and Speakers ■ Touchpad ■ Smart Lithium Ion Battery ■ USB and Fast IR Ports

Quantex H 1210 $2999

Business lease: $105/Mo.

- 200MHz Pentium® Processor with MMX™ Technology
- Intel Mobile Module (I.M.M.)Architecture
- 12.1"SVGA Active Matrix Display
- 16MB SDRAM (expandable to 144MB)/512KB Pipelined Burst Cache
- 1.4GB HD
- Windows 95
- Carrying Case
- 24hr./7-day Technical Support
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

Quantex H 1210(with 166MHz Pentium® Processor with MMX™ Technology) $2799

Quantex H 1211 $3499

Business lease: $114/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- Intel Mobile Module (I.M.M.)Architecture
- 12.1" SVGA Active Matrix Display
- 32MB SDRAM (expandable to 144MB)/512KB Pipelined Burst Cache
- 2GB HD
- PCMCIA 33.6K Fax/Modem
- Windows 95
- Carrying Case
- 24-hr./7-day Technical Support
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

Quantex H 1330 $3999

Business lease: $130/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- Intel Mobile Module (I.M.M.)Architecture
- 13.3" XGA Active Matrix Display
- 32MB SDRAM (expandable to 144MB)/512KB Pipelined Burst Cache
- 3GB HD
- PCMCIA 33.6K Fax/Modem
- Windows 95
- Carrying Case
- 24-hr./7-day Technical Support
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

SUPPORT POLICY

■ 30-day money back guarantee ■ One-year Parts and Labor limited warranty ■ 3 years limited warranty on CPU and Main Memory ■ 1-year Depot Repair ■ 1-year express Replacement limited warranty ■ 24-hr./7-day Toll Free Technical Support

UPGRADES ■ Mini-Docking Station,,, $199 ■ 2nd Lithium Ion Battery... $199 ■ PCMCIA Network Adapter...$129 ■ PCMCIA 33.6k Fax Modem...$129 ■ Deluxe Carrying Case....$99

Here's 3 more reasons to love us. And never

Imagine! A value-packed, award-winning multimedia system at an unmatched price!

Quantex leads the pack when it comes to offering the newest technology at a price that is never out of reach. We have done it again with our QP6/300 M-4x for under $2500. That's right! For only $2499 you can own this fully loaded machine, complete with 300 MHz Pentium® II processor, Intel 440LX chipset, a 17" digital monitor, AGP graphics card, a huge 5GB hard drive loaded with our impressive software bundle and much, much more.

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- 300MHz Pentium® II Processor
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- 64MB SDRAM Memory /512KB Secondary Cache
- 5.1GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 64-bit 3D AGP Graphics Card with 4MB SGRAM
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-9D Speakers
- Includes all Standard Features

QP6/233 M-4x (featuring Pentium II processor).....$2199
QP6/266 M-4x (featuring Pentium II processor).....$2299

QP6/300 M-4x SE — $2999
(featuring Pentium® II processor)
Business lease: $105/Mo.

- 300MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 64MB SDRAM Memory /512KB Secondary Cache
- 6.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D Graphics Card with 4MB SGRAM
- 19" Digital Monitor (18.1" viewable)
- Toshiba 2nd-Generation DVD-ROM Drive (replaces 24x Max CD-ROM)
- DVD Decoder Board
- Altec Lansing ACS-45 Speakers w/subwoofer
- Includes all Standard Features

QP6/233 M-4x SE (featuring Pentium II processor).....$2649
QP6/266 M-4x SE (featuring Pentium II processor).....$2799

The competition can't measure up to our fastest system ever..

Our QP6/300 SM-4x has a mind-boggling 300 MHz Pentium® II Processor, just for starters. And an eye-opening 19" monitor to let you see all this speed in action. We follow this up with a huge 8.4GB Enhanced IDE hard drive to provide all the space you need. Then throw in the 128-bit Riva 128 3D AGP Graphics Card with 4 MB of SGRAM-- for a combination of speed, power and visual fireworks that can't be beat. All backed by Quantex's award winning service and support, including 24 x 7 tech support from living, breathing experts.

QP6/300 SM-4x — $2999
(featuring Pentium® II processor)
Business lease: $105/Mo.

- 300MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- Upgrade to AGP Matrox Millennium II 3D w/8MB WRAM for only
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- Altec Lansing ACS-45 Speakers w/subwoofer
- Includes all Standard Features

QP6/233 SM-4x (featuring Pentium II processor)$2699
QP6/266 SM-4x (featuring Pentium II processor)$2799

QP6/300 SM-4x SE — $3299
(featuring Pentium® II processor)
Business lease: $115/Mo.

- 300MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- 19" Digital Monitor (18.1" viewable)
- Toshiba 2nd-Generation DVD-ROM Drive (replaces 24x Max CD-F
- DVD Decoder Board
- Altec Lansing ACS-49D Speakers w/subwoofer
- Includes all Standard Features

QP6/233 SM-4x SE (featuring Pentium II processor)$2999
QP6/266 SM-4x SE (featuring Pentium II processor)$3099

Value Multimedia Series

Standard Features ■ 2 Universal Serial Bus (USB) Ports ■ K56flex™ protocol Fax/Modem w/Voice Mail and Speakerphone ■ 24X Max EIDE CD-ROM Drive ■ Ensoniq 32-bit Wavetable Sound Card ■ 104-Key Keyboard with MS PS/2 Mouse ■ Quantex Tower Case ■ MS Windows '95 with MS Plus ■ 3-year limited warranty, 24-hr./7-day Tech Support

QP5/166 M-1 — $1349
(with MMX™ Technology)
Business lease: $47/Mo.

- 166MHz Pentium® Processor with MMX™ Technology
- 24MB EDO Memory 512KB Pipeline Burst Cache
- 3.2GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D with 4MB SGRAM
- 15" Digital Monitor (14.0" viewable)
- 24X Max EIDE CD-ROM Drive
- Altec Lansing ACS-9D Speakers

QP5/200 M-1 (with MMX Technology).....$1449
QP5/233 M-1 (with MMX Technology).....$1549

QP5/233 M-2 — $1799
(with MMX™ Technology)
Business lease: $63/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- 32MB EDO Memory /512KB Pipeline Burst Cache
- 4.3GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D w/4MB SGRAM
- Upgrade to Matrox Mystique 220 w/4MB SGRAM and Rainbow Runner for only $99
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-9D Speakers
- Value Multimedia Software Bundle

QP5/166 M-2 (with MMX Technology).....$1649
QP5/200 M-2 (with MMX Technology).....$1699

QP6/233 M-3x — $1999
(featuring Pentium® II Processor)
Business lease: $70/Mo.

- 233MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 64MB SDRAM Memory /512KB Secondary Cache
- 4.3GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 64-bit 3D AGP Graphics Card with 4MB SGRM
- Upgrade to Matrox Mystique 220 w/4MB SGRAM and Rainbow Runner for only $99
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-45 Speakers with subwoofer
- Value Multimedia Software Bundle

QP6/266 M-3x (featuring Pentium II Processor).....$2199
QP6/300 M-3x (featuring Pentium II processor).....$2399

Power Multimedia Series

Standard Features ■ 2 Universal Serial Bus (USB) Ports ■ K56flex™ protocol Fax/Modem w/Voice Mail and Speakerphone ■ 24X Max EIDE CD-ROM Drive ■ Ensoniq 32-Bit Wavetable Sound Card ■ 104-Key Keyboard With MS IntelliMouse ■ MS Windows '95 With MS Plus ■ Power Multimedia Software Bundle *(including MS Office '97 SBE)* ■ 3-year limited warranty, 24-hr./7-day Tech Support ■ Quantex Tower Ca

QP5/233 SM-1 — $1699
(with MMX™ Technology)
Business lease: $60/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- 32MB EDO Memory / 512KB Secondary Cache
- 3.2GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D with 4MB
- 15" Digital Monitor (14.0" viewable)
- Altec Lansing ACS-9D Speakers

QP5/200 SM-1 (with MMX Technology).....$1599
QP6/233 SM-1x (featuring Pentium II processor)$1799
QP6/266 SM-1x (featuring Pentium II processor)$1999

QP6/233 SM-2x — $2049
(featuring Pentium® II processor)
Business lease: $72/Mo.

- 233MHz Pentium® II Processor
- 32MB EDO Memory / 512KB Secondary Cache
- 4.3GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D with 4MB
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-9D Speakers
- Upgrade SM-2 to 64MB EDO RAM and 5.1GB HD for only $150

QP5/200 SM-2 (with MMX Technology).....$1799
QP5/233 SM-2 (with MMX Technology).....$1899
QP6/266 SM-2x (featuring Pentium II processor).$2199

QP6/266 SM-3x — $2399
(featuring Pentium® II processor)
Business lease: $84/Mo.

- 266MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 64MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-45 Speakers w/subwoofer

QP6/233 SM-3x (featuring Pentium II processor)$2249
QP6/300 SM-3x (featuring Pentium II processor)$2599

Software Bundle

■ Corel Office Suite ■ MS Money '97 ■ Compton's Interactive Encyclopedia ■ Compton's Interactive World Atlas ■ Key Master Maps ■ Body Works 6.0 ■ American Heritage Talking Dictionary ■ Amazon Trail II ■ Internet the City ■ Compton's Reference Collection ■ Dr. Solomons Anti-Virus ■ Windows 95 with MS Plus ■ One-month trial memberships to AOL, CompuServe and Prodigy

Software Bundle

■ MS Office '97 SBE ■ MS Money '97 ■ Office Mate ■ Day Planner Pro ■ Power Business Plans ■ Form Designer Pro ■ Project Manager Pro ■ Labels Unlimited ■ Compton's Reference Collection ■ Dr. Solomons Anti-Virus ■ Windows 95 with MS Plus ■ One-month trial memberships to AOL, CompuServe and Prodigy

Upgrade (available with system purchase)

■ Panasonic PD/CD-Rom Drive w/ one 650MB PD cartridge $ 249 ■ Three(3) Panasonic PD Cartridges $99 ■ Microsoft Natural Keyboard (upgrade from 104-keyboard). $ 39 ■ HP Deskjet 692C Printer (w/photo color kit)....$ 299 ■ HP Laserjet 6L Laser Printer....$ 399

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Second, because Quantex network-ready systems are Network-Ready Certified by 3Com. Each network adaptor is pre-installed, pre-tested and certified to work within their network environment, so managers know that reliable connections are guaranteed.

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- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- 19" Digital Monitor (18.1" viewable)
- 3COM 3c905 PCI 10/100 NIC
- 24X Max EIDE CD-ROM Drive
- ATX Case
- 104-Key Keyboard with MS PS/2 Mouse
- MS Windows NT 4.0 Workstation
- 3-year limited warranty, 24-hr./7-day Technical Support
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QP6/233 WS-3x (featuring Pentium® II Processor). . $2549
QP6/300 WS-3x (featuring Pentium® II Processor). . $2899

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QP5/166 WS-1 $1199
(with MMX™ Technology)

Business lease: $42/Mo.

- 166MHz Pentium® Processor with MMX™ Technology
- 16MB EDO Memory / 512KB Pipeline Burst Cache
- 2.1GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 15" Digital Monitor (14.0" viewable)
- Mini-Tower Case
- 2 Universal Serial Bus (USB) Ports
- 3-year limited warranty, 24-hr./7-day Technical Support

QP5/200 WS-1 (with MMX Technology).....$1299
QP5/233 WS-1 (with MMX Technology).....$1399

QP5/233 WS-2 $1699
(with MMX™ Technology)

Business lease: $60/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- 32MB EDO Memory / 512KB Pipeline Burst Cache
- 3.2GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 17" Digital Monitor (16.1" viewable)
- Mid-Tower Case
- 2 Universal Serial Bus (USB) Ports
- 3-year limited warranty, 24-hr./7-day Technical Support

QP5/166 WS-2 (with MMX Technology).....$1499
QP5/200 WS-2 (with MMX Technology).....$1599

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Route 56K

Fast Modems, but Watch for Speed Bumps

BY BRYAN HASTINGS AND PATRICK MARSHALL

BUYING A 56-KBPS MODEM today is risky business. Even if you're going into the purchase with eyes wide open, aware that what you're getting is not twice as speedy as a 28.8-kbps modem and can't send files any faster than a 33.6-kbps unit, you could still face hurdles. For instance, your favorite Internet service provider may not support the protocol that your modem is based on—x2 or K56flex. For example, an x2-based 56-kbps modem won't be any faster than 33.6 kbps if it's dialing in to a server that supports only K56flex. And your phone line may not support the higher speed, period. Then there's the fear that no matter how reassuring the upgrade promises from the modem vendor, you could still be left out in the cold when a 56-kbps standard is finally determined.

Yet, as *PC World* found after six months of testing the first 56-kbps units, these modems can be a low-cost way for many people to enjoy significantly faster Web surfing. This month we tested the biggest batch yet of 56-kbps modems—eight internal units and five external models. We rated performance, ease of installation, price, and features, as well as support and upgrade policies, to come up with our Best Buys.

The new **56-kbps modems** have some **gotchas,** but they're still the cheapest way to **speed up** the Web.

PHOTO ILLUSTRATIONS BY ALLEN WALLACE

Our findings? Of the 13 modems we tested, only 2 sell for over $200. And as we found in previous tests, 56-kbps modems download files about 53 percent faster than they can send them. Thus, they are significantly faster for downloading ▶

Web pages and files, while costing only about $50 more on average than a $120 33.6-kbps internal modem. However, our tests show that on average, 56-kbps modems send files only slightly faster than their 33.6-kbps counterparts.

Modem companies are finally offering solid upgrade plans to the eventual 56-kbps standard, too. The Courier V.Everything 56K Internal and the Sportster 56K Faxmodem External Model 1786 earned Best Buys in part because of 3Com/U.S. Robotics' excellent support policies. The company guarantees free upgrades, even if it means sending customers a brand-new modem and paying the postage and handling. Cardinal, Hayes, Motorola, and Zoom will also do a free modem swap, but you'll have to pick up the mailing costs.

A 56-kbps modem isn't for everyone. If you're a casual Web surfer, or if you spend more time sending files than receiving them, a 33.6-kbps model can be just as effective. And in terms of features, 56-kbps modems also lag behind their 33.6-kbps siblings. Few of the 56-kbps modems we looked at come as fully decked out with voice mail, password protection, and other extras. So if you want to use your PC as an answering machine or if you place high importance on communications security, you may not want to buy until more 56-kbps modems come with these features.

Even if a 56-kbps modem seems to fit your needs, how do you know that it will work at top speeds? Unfortunately, you don't—until you buy one and try it. Your best bet is to do your homework beforehand to see if a 56-kbps modem *might* be appropriate, then make sure you get a money-back guarantee when you do buy. In "Can You Do 56 kbps?" our ten-point guide covers everything from spotting an ISP that supports the higher speed to troubleshooting a 56-kbps modem.

Best Buys

OUR TOP-RANKED internal 56-kbps modem, IBM's 56K Modem Internet Kit, is priced affordably at $149 and is the best choice if you want a PC-based voice-mail and speakerphone system for a small or home office. It was easy to install, and it's the only modem we tested that's backed by round-the-clock support. Our number two internal Best Buy, the 3Com/U.S. Robotics Courier V.Everything 56K, is pricey at $260 but ideal for offices already equipped with speakerphones and voice mail.

TESTING IN THE REAL WORLD

WE EVALUATED SPEED USING two methods: We dialed in to an ISP over a live line, and we tested over a Telecomm Analysis Systems simulated public phone network. Results for live-line tests varied because of fluctuating Internet traffic,

56-KBPS MODEMS FEATURES COMPARISON SCORECARD

	INTERNAL MODELS	56-kbps protocol supported	Street price (8/15/97)	Ease of installation	Performance	Documentation	Software bundle
1	IBM 56K Modem Internet Kit	x2	$149	good	average	satisfactory	outstanding
2	3Com/U.S. Robotics Courier V.Everything 56K Internal	x2	$260	good	above average	very good	outstanding
3	Zoom FaxModem 56K	K56flex	$149	satisfactory	average	good	very good
4	Diamond Multimedia SupraExpress 56i	K56flex	$120	very good	average	unsatisfactory	very good
5	Motorola ISG ModemSurfr 56K Internal Data/Fax Modem	K56flex	$159	very good	average	good	good
6	MaxTech NetPacer Pro XPVS56I	x2	$119	poor	above average	unsatisfactory	good
7	Cardinal Connecta 56K Internal Faxmodem	x2	$149	very good	below average	very good	very good
8	3Com/U.S. Robotics Sportster 56K Faxmodem Internal	x2	$199	satisfactory	average	very good	very good
	EXTERNAL MODELS						
1	3Com/U.S. Robotics Sportster 56K Faxmodem External	x2	$219	very good	above average	very good	very good
2	Zoom FaxModem 56Kx	K56flex	$169	good	average	good	very good
3	Diamond Multimedia SupraExpress 56e	K56flex	$140	good	average	good	very good
4	Motorola ISG ModemSurfr 56K Desktop Data/Fax Modem	K56flex	$179	satisfactory	average	good	good
5	Hayes Accura 56K External Fax Modem	K56flex	$189	very good	below average	good	good

Best Buy ● Yes ○ No

[1]Digital Simultaneous Voice/Data (DSVD).

It's the fastest internal unit we tested after the NetPacer Pro, it comes with a big software bundle, and it's backed by a free upgrade policy that should see you safely through the finalization of the 56-kbps standard. The $219 3Com/U.S. Robotics Sportster 56K is our top external modem. Like the Courier it's not cheap, but it's fast, comes with lots of software, and has a great upgrade plan.

Two other modems get honorable mentions. MaxTech's NetPacer Pro boasts very good speed, costs only $119, and comes with voice mail and speakerphone. It's tough to install, however, and you may not be able to upgrade it for free to the eventual 56-kbps standard. If you're looking for a good traveling companion and don't mind basic features and design, check out Diamond's Supra-Express 56e, an ultracompact $140 external model that comes with a built-in serial cable.

among other issues. However, the live connections let us see how close the modems could come to their top download speed of 56 kbps in a real-world setup. The TAS network is a self-contained system in the PC World Test Center that's limited to testing 33.6-kbps modem speeds. Testing the 56-kbps units here let us see how they stacked up to 33.6-kbps modems when limited to connections at 33.6 kbps for file uploads or when conditions prevent downloading at 56 kbps—when an ISP doesn't support your modem's specification, for instance. When we began testing for this review, there still were no ISPs that supported both the warring 56-kbps protocols, x2 and K56flex. We signed up with Epoch to test K56flex modems, and with ANS (a division of America Online) to test x2 units.

In our ISP tests, we didn't find many speed differences among the 13 modems. They almost all turned in the same superior performance when downloading files—they were about 50 percent faster than their 33.6-kbps counterparts. The quickest by a nose was MaxTech's NetPacer Pro XPVS56I, a supercheap but hard-to-install model that landed in sixth place among the internal modems. It was followed closely by the 3Com/U.S. Robotics Sportster 56K Faxmodem External Model 1786, our external Best Buy. Both units grabbed files at an average of slightly under 3 minutes per megabyte, compared to an average upload speed of 4.75 minutes per megabyte among the 56-kbps modems. Hayes's Accura 56K External Fax Modem was slowest, taking 34 seconds longer than our speed champs to download 1MB of data.

As for sending files on our TAS test setup, we found that most 56-kbps modems are a little faster than 33.6-kbps ▶

	FEATURES							SUPPORT		
Upgrade policies	Fax/data software package	Modem length (internal) or size (external)	Chip set	Voice/data phone line sharing	Voice mail/ full-duplex speakerphone	Caller ID	Distinctive ring	Warranty (years)	Weekday support (hours)	Toll-free/ weekend support
good	QuickLink Message Center	average	USR/TI	●[1]	●/●	●	●	5	24	●/●
outstanding	USR RapidComm	short	USR/TI	○	○/○	●	●	5	10	●/○
very good	COMit, WinFax Lite	short	Rockwell	○	○/○	○	●	7	14.5	○/●
good	COMit, FaxTalk Plus	average	Rockwell	○	○/○	○	●	5	14	○/●
very good	Trio Communications Suite 5.1	average	Rockwell	○	○/○	●	●	5	9	●/○
fair	SuperVoice 2.2	average	USR/TI	○	●/●	○	○	5	12	○/○
very good	FaxTalk Plus	short	USR/TI	○	○/○	○	○	5	12	○/○
outstanding	USR RapidComm	short	USR/TI	○	○/○	●	●	5	10	○/○
outstanding	USR RapidComm	compact	USR/TI	○	○/○	●	●	5	10	○/○
very good	COMit, WinFax Lite	average	Rockwell	○	○/○	○	●	7	14.5	○/●
good	COMit, FaxTalk Plus	compact	Rockwell	○	○/○	○	○	5	14	○/●
very good	Trio Communications Suite 5.1	average	Rockwell	○	○/○	●	●	5	9	●/○
very good	SmartCom	average	Rockwell	○	○/○	○	○	5	10	○/○

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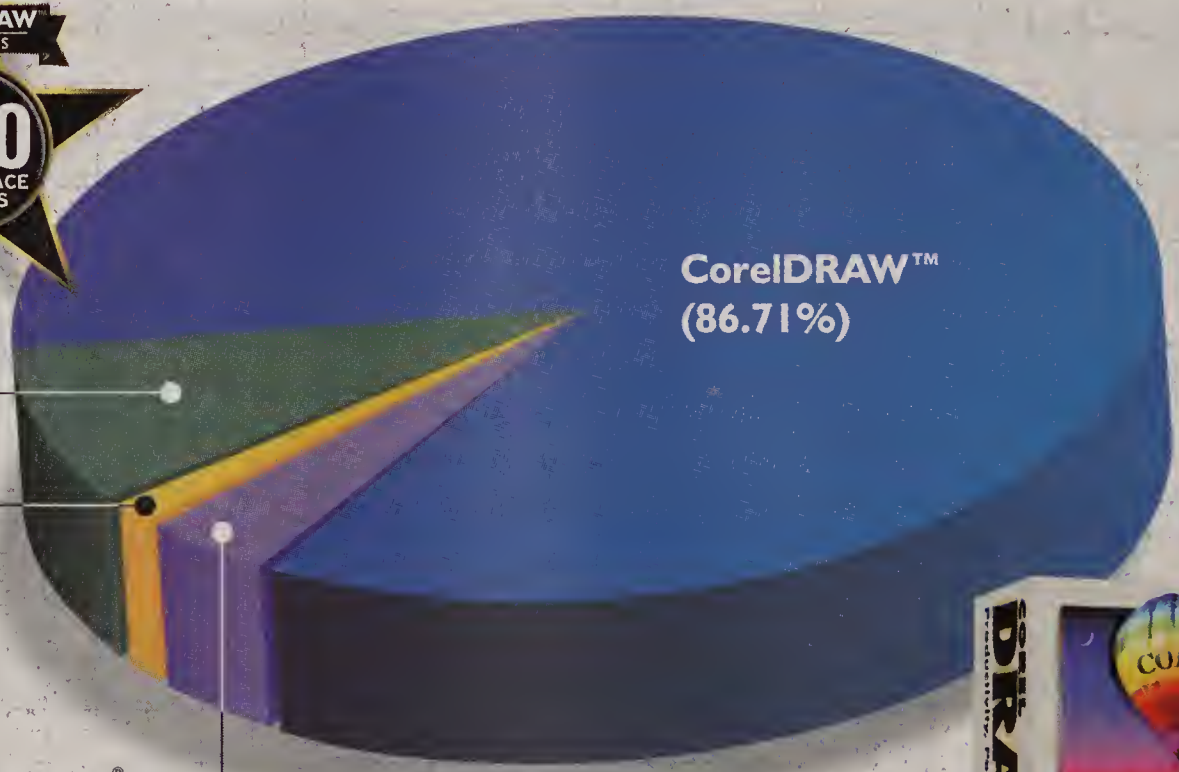

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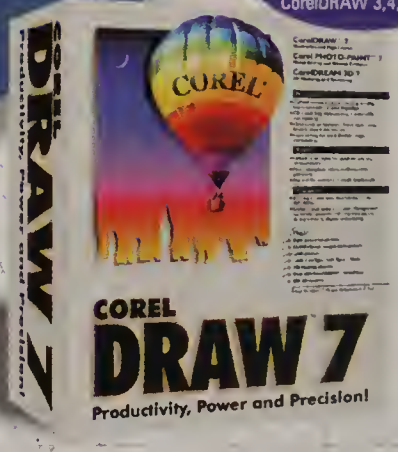

†Market Share – Drawing & Painting Software, *PC Data* 1996 unit sales.
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Standard RAM	16MB EDO RAM	16MB EDO RAM	16MB EDO RAM
Total RAM With Free Upgrade*	32MB EDO RAM	32MB EDO RAM	32MB EDO RAM
Hard Drive	1.4 GB SMART hard drive	1.4 GB SMART hard drive	2.1 GB SMART hard drive
Display Size/Type	12.1" CSTN (SVGA)	12.1" CTFT (SVGA)	12.1" CTFT (SVGA)
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*Free offer with purchase of Armada 1530DM, 1550DMT, and 1580 DMT from DirectPlus or participating resellers, from 9/1/97 through 11/30/97, while supplies last. Other Armada 1500 Family models do not qualify for free offer. Reseller installation charges may apply, and are not included. Offer not valid outside U.S. or on refurbished Compaq products. Products, prices, and programs are subject to change without notice. **All prices shown are Compaq DirectPlus prices. Reseller prices may vary. ©1997 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo registered U.S. Patent and Trademark Office. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation.

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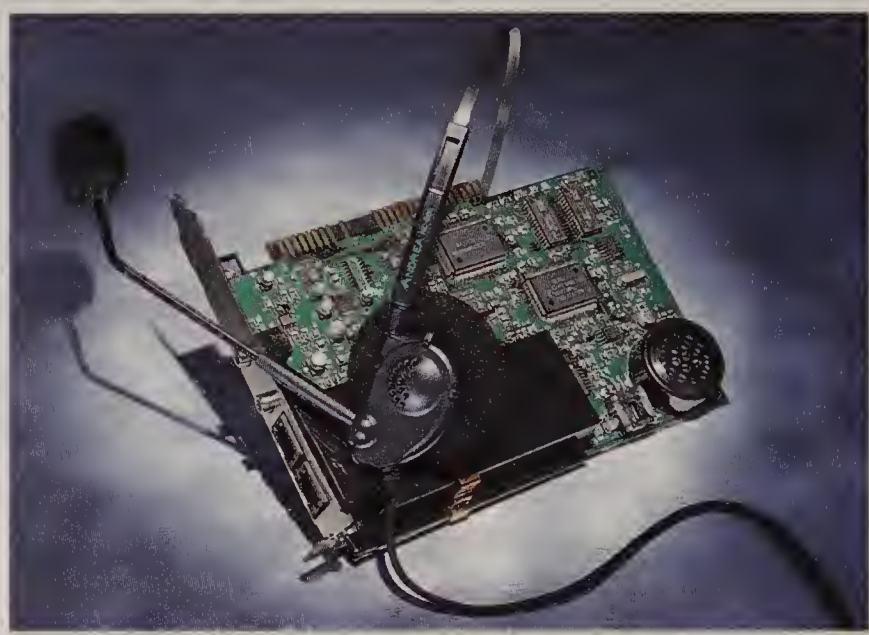
models. The only bad performer in this test was Cardinal's Connecta 56K Internal Faxmodem: It took a half minute per megabyte longer to send our files than the fastest unit, MaxTech's NetPacer Pro.

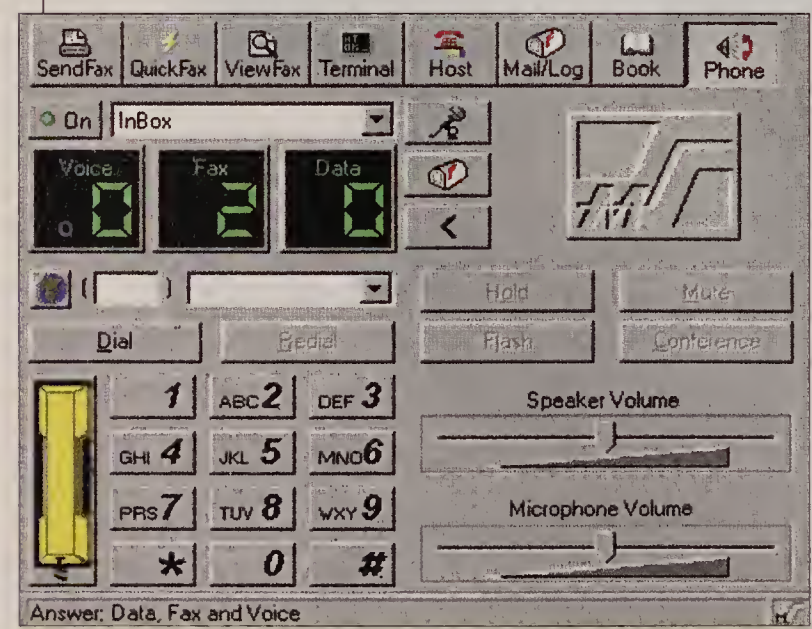
Bottom line? For Web surfing and downloading files, the 56-kbps modems offer much faster performance than their 33.6-kbps counterparts. However, if you're primarily sending files, or if you can't get a 56-kbps connection, you will notice little or no difference, except with unusually slow units like the Connecta 56K.



LISTEN UP: IBM's 56K Modem Internet Kit turns your PC into a high-grade speakerphone and allows voice and data on the same phone line.

WILL THEY EVER GET PLUG AND PLAY RIGHT?

NOT SURPRISINGLY, we found external modems much easier to install than internal models. In almost every case, all we had to do was connect an external modem to the PC's serial port, turn on the PC, and pop in the modem's setup disk when Windows 95 asked for it. The only problem unit was Motorola's ISG ModemSurfr 56K Desktop Data/Fax Modem, which Windows didn't recognize. To get it to work, we had to run the Install New Modem option in Windows' Control Panel.



GET THE MESSAGE? IBM's 56K Modem Internet Kit software shows the number of fax, voice, and data messages received.

We had far more setup headaches with the internal modems. The 3Com/U.S. Robotics Sportster 56K Faxmodem Internal, MaxTech's NetPacer Pro XPVS56I, and the Zoom FaxModem 56K failed to install automatically on one or both of our installation test systems. We had to set the PC's COM port and IRQ manually, a process that can easily eat up several hours and require a call to support if you're a novice at installing hardware.

BARE BONES FOR NOW

IF YOU WANT A 56-kbps modem with all the bells and whistles found on many 33.6-kbps modems, you may have to wait a bit longer. Of the 13 modems we reviewed, only IBM's 56K Modem Internet Kit and MaxTech's NetPacer Pro are capable of acting as a phone answering machine, for instance. Do you want a modem that allows your voice and data to travel over the same phone line simultaneously—say, for multiplayer gaming over the Internet, or for talking to someone while sending a file? Here, the IBM modem is the only game in town. Fewer than half the 56-kbps units we reviewed offer Caller ID, although most support distinctive ring. If your telephone company allows Caller ID (and if your communications software supports it), you can screen incoming calls before the modem picks up; this feature lets you reject a call or shunt it to the appropriate mailbox. Distinctive ring capability routes each incoming call to a particular mailbox based on its ring type.

56K AND COUNTING

A 56-KBPS MODEM isn't the final word on faster surfing. ISDN, DSL, cable, and satellite are emerging technologies that can provide much greater speed. But these alternatives are costlier, can be harder to install, and aren't yet as widely available. For now, a 56-kbps modem is the cheapest, easiest way to improve your Web experience—if your phone service and ISP support it.

Bryan Hastings is a senior associate editor for PC World. *Patrick Marshall is a senior writer for* InfoWorld.

For more information about all products in this article, circle reader service no. 911.

Internal Modems

IBM 56K MODEM INTERNET KIT

PRO: Feature packed, excellent support, generous software bundle, voice mail and speakerphone

CON: Upgrade to 56K standard may not be free

1

Looking for a low-price x2 modem complete with voice mail and speakerphone for your home or small office? At $149, IBM's 56K Modem Internet Kit costs $30 more than MaxTech's NetPacer Pro, the other voice-equipped modem in this roundup. But the IBM unit caters to SOHO users with round-the-clock support and Plug and Play installation. It also lets you indulge in some multiuser game play over the Net, using the modem's Digital Simultaneous Voice/Data feature and the supplied microphone and stereo headphones. You can use QuickLink's Message Center to make use of the modem's voice-mail and speakerphone capabilities, and the unit offers support for distinctive ring and Caller ID.

In fact, the software bundle is one of the best we've seen. In addition to QuickLink, you get IBM Antivirus, IBM Home Page Creator, IBM Internet Connection Phone, IBM VoiceType Connection and VoiceType Control, Netscape Navigator 3.0, ▶

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and Net Nanny Lite. Chief drawback? IBM doesn't guarantee a free modem swap if you aren't able to upgrade to the upcoming 56-kbps standard through software. *IBM, 800/426-2968, www.pc.ibm.com*

3COM/U.S. ROBOTICS COURIER V.EVERYTHING 56K INTERNAL

PRO: Very fast, consumer and corporate features, lots of software, great support and upgrade plan

CON: Expensive

2 No modem we've seen is all things to all people, but the Courier V.Everything comes closest to that ideal. While $260 is a lot to fork out for a modem these days, this x2-based unit is a clear winner and one of the best of this bunch for the small- and home-office crowd. And this Plug and Play unit installed without a hitch in our tests.

The Courier caters to the consumer, but it also comes with features typically found in corporate modems. In addition to standard fare such as support for distinctive ring and Caller ID, you get security features like callback and password-protected access to the modem itself. Still missing: voice mail, speakerphone, and simultaneous voice/data operation.

The CD-ROM that comes with the V.Everything is loaded with software. Besides the capable RapidComm fax/data program, you get Stampede Remote Office and over a dozen other programs.

Most people would be satisfied with the download speed of any modem reviewed here, but those who surf the Net for a living will appreciate every kilobit per second they can squeeze out of a modem. After MaxTech's NetPacer Pro and 3Com/U.S. Robotics' external Sportster, the Courier is the fastest modem in this roundup, sending a megabyte of data more than half a minute faster than the slowest contender, Hayes's Accura 56K External.

Support offerings from 3Com/USR are very good, including cross-ship replacement. The company also guarantees a free upgrade to the 56-kbps standard, even if it means a modem swap, and will pay shipping and handling to boot. *3Com/U.S. Robotics, 800/877-2677, www.3com.com*

READER SERVICE NO. 759

ZOOM FAXMODEM 56K

PRO: Very low price, long support hours, unconditional free upgrade to 56K standard

CON: Short on features, installation a little rough

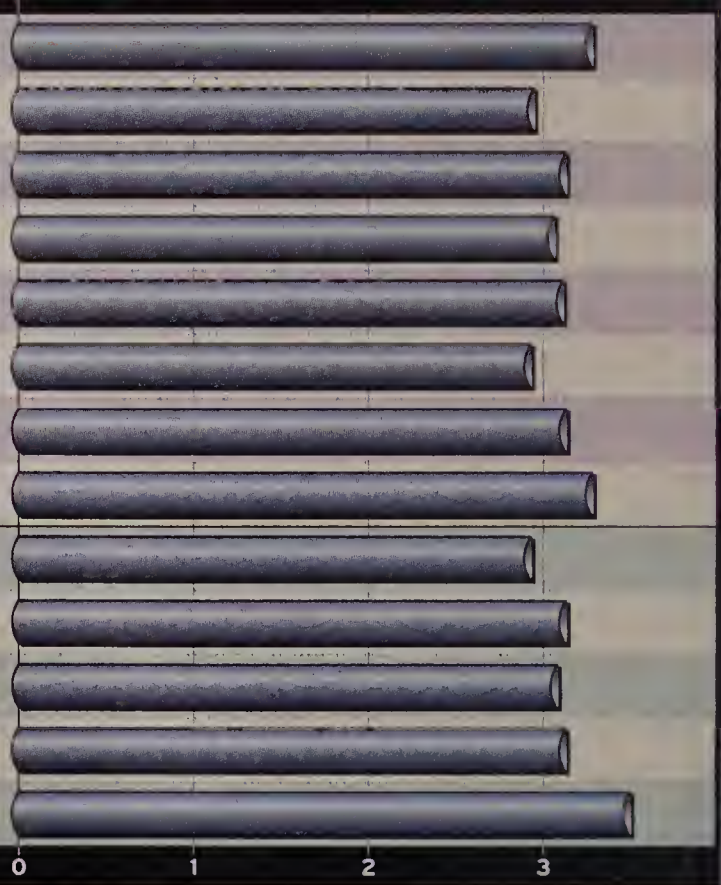
3 If you're looking for a low-cost entrée to high-speed Web surfing and have some technical savvy—or at least are willing to spend time with tech support—check out Zoom's $149 FaxModem 56K. ▶

TEST REPORT

NetPacer, Sportster Fastest at 56-kbps Downloads

On average, internal and external modems perform about the same at 56 kbps.

	MODEMS	Effective transfer rate (kbps)[1]
INTERNAL	1 IBM 56K Modem Internet Kit*	53.1
	2 3Com/U.S. Robotics Courier V.Everything 56K Internal*	59.2
	3 Zoom FaxModem 56K	55.9
	4 Diamond Multimedia SupraExpress 56i	57.0
	5 Motorola ISG ModemSurfr 56K Internal Data/Fax Modem	56.2
	6 MaxTech NetPacer Pro XPVS56I	59.8
	7 Cardinal Connecta 56K Internal Faxmodem	55.7
	8 3Com/U.S. Robotics Sportster 56K Faxmodem Internal	53.4
EXTERNAL	1 3Com/U.S. Robotics Sportster 56K Faxmodem External*	59.7
	2 Zoom FaxModem 56Kx	55.8
	3 Diamond Multimedia SupraExpress 56e	56.9
	4 Motorola ISG ModemSurfr 56K Desktop Data/Fax Modem	55.8
	5 Hayes Accura 56K External Fax Modem	49.8



*Best Buy

[1]Effective transfer rate is the raw transfer rate times the compressibility factor of the file being sent. For example, a modem connected at 26.4 kbps sending a file compressed to half its original size (a typical compressibility factor for text files) is sending the file at an effective transfer rate of 52.8 kbps.

HOW WE TEST For our Internet service provider tests, we called a local ISP access number and transferred .jpeg, .doc, and .zip files continuously over an 18-hour period. For our Telecomm Analysis Systems tests, we tested the 56-kbps modems' abilities to send and receive files at 33.6 kbps (V.34) on a simulated phone network in the PC World Test Center. We performed the TAS tests to directly compare the 56-kbps modems' results to those of 33.6-kbps modems we've tested for previous reviews. We omit the TAS results here because they don't reveal significant performance differences between current and previously reviewed modems. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

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Bragging Rights - email some shots of your skydiving videotape to the grandkids

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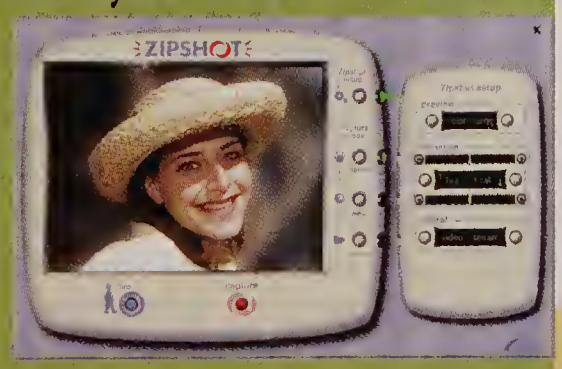
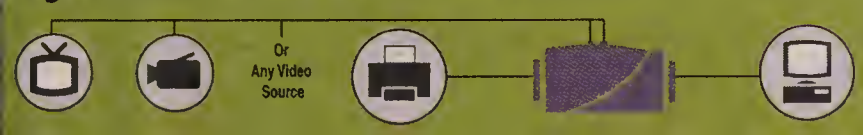


Diagram of Connections and Printer Pass-Thru



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Circle 8 on reader service card

This K56flex unit has few frills and is no fun to install. Plug and Play installation did not work with our Quantex test PC, which uses the AMI BIOS, so we had to set its COM port and IRQ by using jumpers on the board. Even if we had been able to install the modem successfully as a Plug and Play device, the manual neglects to explain how to proceed with the software installation. But if *IRQ* sounds as daunting to you as *IRS*, you have plenty of opportunity to ask for help—calls to Zoom tech support are not toll-free, but technicians are available 14.5 hours every weekday and 8 hours on Saturday. Zoom's warranty runs for a lengthy seven years.

SMALL IS BEAUTIFUL: Diamond's SupraExpress 56e, the smallest external modem we reviewed, is half the size of Zoom's FaxModem 56Kx.

The 56-kbps standard is due out next year, and Zoom just committed to providing an upgrade to its current 56-kbps customers for free, even if it means swapping modems; the only cost to the customer will be a $19 shipping and handling charge. A software upgrade may be all that's needed, however. The FaxModem, like all other modems reviewed here except the NetPacer Pro, has a software-upgradable digital signal processor.

The only software that comes bundled with the FaxModem 56K consists of the fax and data packages, but both of them get our nod of approval: COMit is a very capable data communications program, and WinFax Lite has strong viewing features and an easy-to-use phone book. *Zoom Telephonics, 800/631-3116, www.zoomtel.com*

READER SERVICE NO. 760

DIAMOND MULTIMEDIA SUPRAEXPRESS 56I

PRO: Low price, good support, easy installation

CON: Flawed documentation, support is a toll call, upgrade to 56-kbps standard may not be free

4 If you're looking for a lot of SOHO functions in a modem, keep looking. The SupraExpress 56i has just the data/fax, ma'am. This $120 K56flex model is a fast and very inexpensive board to get you on the Internet, but it lacks voice and security features. It comes with COMit, a capable data package, and FaxTalk Plus, a stodgy, barebones fax program that lacks even a cover-page generator.

The SupraExpress's main flaw, however, is flaky documentation. It's too technical in some places and plain wrong in others. The Plug and Play feature of the modem worked for us without a hiccup, but had it failed we would have been in trouble: Despite documentation that indicates otherwise, the SupraExpress 56i comes without any jumpers for setting the IRQ; rather, the settings are done through software in Windows 95's Control Panel.

> If you have **technophobia,** don't **touch** MaxTech's NetPacer Pro with a 10-foot **telephone cord.**

We were generally satisfied with Diamond's support policies. If you run into any installation snags, tech support is a toll call but is available for 14 hours each weekday plus 8 hours on Saturday. And the company offers a decent five-year warranty. But we're worried about the short term: Diamond is currently committing only to providing a free software upgrade to the 56K standard when it comes out next year. If the upgrade requires a hardware swap, you could be out the cost of a new modem. *Diamond Multimedia, 800/727-8772, www.diamondmm.com*

READER SERVICE NO. 761

MOTOROLA ISG MODEMSURFR 56K INTERNAL DATA/FAX MODEM

PRO: Affordable, toll-free tech support, unconditional free upgrade to 56-kbps standard

CON: Short support hours

5 The $159 ModemSurfr is a low-cost K56flex offering with many fine points. It installed flawlessly, performed decently in our tests, and has distinctive ring and Caller ID. It also supports V.80 videoconferencing. What kept it down on the chart were Motorola's brief support hours—9 hours per weekday—and sparse printed documentation.

The ModemSurfr comes with an attractive software bundle. Trio Communications Suite 5.1 has a simulated desktop graphical interface whose design makes it fun to use. You can set up the software for either novices or experienced users; the difference is the extent to which the interface explains the package's features.

Motorola's policy for upgrading to the 56-kbps standard is as good as you'll find, after 3Com/U.S. Robotics'. Shipping and handling is not included, but the company has committed to upgrading each 56-kbps modem for free, even if it has to send out a new unit. *Motorola ISG, 800/566-3266, www.mot.com/modems*

READER SERVICE NO. 762

MAXTECH NETPACER PRO XPVS56I

PRO: Fastest and least expensive, has voice mail and speakerphone

CON: Difficult installation, support isn't toll free, upgrade to 56-kbps standard may not be free

6 If all we rated were price and performance, MaxTech's NetPacer Pro XPVS56I would surf circles around its competitors. This $119 model is the cheapest 56-kbps modem we reviewed, undercutting the Diamond SupraExpress 56i by a dollar and putting the price of this unit with speakerphone and voice mail near the average for similarly configured 33.6-kbps modems. The NetPacer Pro is the ▶

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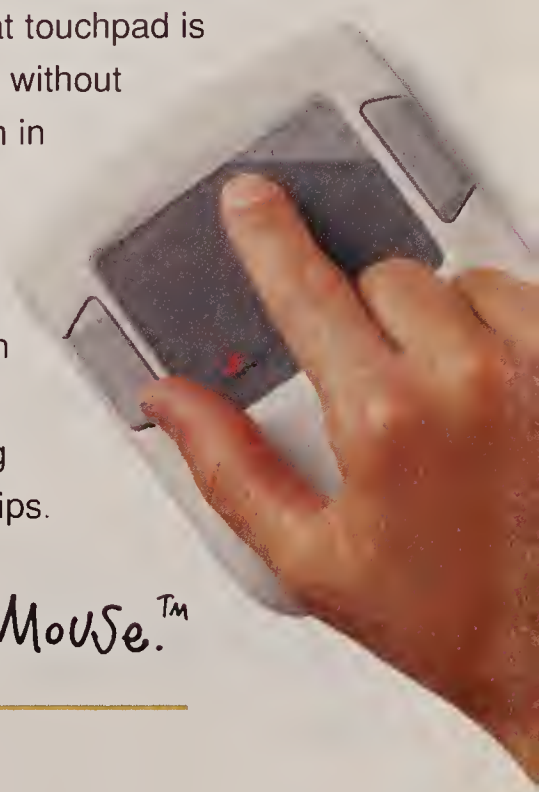

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- *NEW* Creative Labs AWE64 Value Sound Card
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233MHz PENTIUM® PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

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- 1000LS Monitor (15.9" v.i.s.)
- Matrox Millennium II 4MB WRAM PCI Video Card
- Sound Blaster 16 WaveSynth Wavetable Sound
- Altec Lansing ACS-90 Speakers
- ★ *Upgrade to an 8.4GB Hard Drive with 512KB Cache, add $89.*

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Business Lease◊: $80/Mo., 36 Mos.
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FEATURING MMX TECHNOLOGY

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- *NEW* Matrox Millennium II 8MB WRAM AGP Video Card*
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-490 Full Dolby Surround Sound Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive with One Cartridge

$3599

Personal Lease: $160/Mo., 24 Mos.◊θ
Order Code #501004

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266MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

Common features listed above plus:

- 64MB SDRAM Memory
- *NEW* 8.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms)
- *NEW* 1000TX Trinitron Monitor (15.9" v.i.s., .26dp, 1280x1024 max. res.)
- *NEW* STB Velocity 4MB AGP Video Card
- *NEW* Creative Labs AWE64 Value Sound Card
- Altec Lansing ACS-490 Full Dolby Surround Sound Speakers with Subwoofer

$2999

Personal Lease: $134/Mo., 24 Mos.◊Σ
Order Code #501003

NEW DELL DIMENSION XPS D233
233MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

Common features listed above plus:

- 32MB SDRAM Memory
- *NEW* 6.4GB Ultra ATA Hard Drive (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB Velocity 4MB AGP Video Card
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-290 Speakers with Subwoofer
- ★ *Upgrade to 64MB SDRAM, add $179.*
- ★ *Upgrade to a Creative Labs AWE64 Value Sound Card, add $39.*

$2499

Personal Lease: $111/Mo., 24 Mos.◊∞
Order Code #501002

DELL DIMENSION XPS M200s
200MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

- 32MB SDRAM Memory
- 4.3GB Hard Drive (9.5ms)
- 800HS Trinitron Monitor (13.7" v.i.s., .26dp)
- Matrox Millennium II 4MB WRAM PCI Video Card
- Sound Blaster 16 WaveSynth Wavetable Sound
- Altec Lansing ACS-290 Speakers with Subwoofer
- ★ *Upgrade to a 1000LS Monitor (15.9" v.i.s.), add $99.*

$1999

Personal Lease: $89/Mo., 24 Mos.◊π
Order Code #501001

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200MHz PENTIUM PROCESSOR WITH MMX TECHNOLOGY

Common features listed above plus:
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- 3.2GB Hard Drive (12ms)
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- 2MB EDO ViRGE 3D Video
- Iomega Zip 100MB Internal Drive with One Cartridge
- 3Com EtherLink III 10Mbit ISA Combo Card

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Common features listed above plus:
- 64MB ECC EDO Memory (512MB Max)
- 2GB Ultra-Wide SCSI-3 Hard Drive (27GB Max)
- 24X Max§ Variable SCSI CD-ROM
- 6 Drive Bays: 3 Hard Drive, 3 Removable Media
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★ *Upgrade to 266MHz Pentium II Processor, add $300.*
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Common features: ◆ Modular Options Bay accepts 20X Max°° Variable CD-ROM, 3.5" Floppy Drive (both included), or Optional 2nd Li-Ion Battery ◆ Smart Lithium Ion Battery ◆ Microsoft Windows 95 ◆ Microsoft Office 97 Small Business Edition ◆ Microsoft Internet Explorer ◆ Touchpad ◆ Extendable 1 Year Warranty†

***NEW* DELL INSPIRON® 3000 M233XT**
233MHz PENTIUM PROCESSOR w/MMX

Common features listed above plus:
- 13.3" XGA Active Matrix TFT Display
- 32MB SDRAM (144MB Max)
- 512KB L2 Pipeline Burst Cache
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- 2.1GB ATA Hard Drive
- Zoom Video and USB Ports
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- Cardbus ready/Fast IR1.1
- 6.9 Pounds*

★ *Upgrade to 64MB SDRAM, add $399.*

$3999‡

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Order Code #800186

***NEW* DELL INSPIRON 3000 M200ST**
200MHz PENTIUM PROCESSOR w/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix TFT Display
- 32MB SDRAM (144MB Max)
- 512KB L2 Pipeline Burst Cache
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- 2.1GB ATA Hard Drive
- Zoom Video and USB Ports
- Stereo Speakers with 3D Surround Sound and Yamaha SW Wavetable
- Cardbus ready/Fast IR1.1
- 6.4 Pounds*

★ *Upgrade to a 4GB Hard Drive, add $349*

$3399‡

Business Lease: $120/Mo., 36 Mos.
Order Code #800187

***NEW* DELL INSPIRON 3000 M166ST**
166MHz PENTIUM PROCESSOR w/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix TFT Display
- 16MB SDRAM (144MB Max)
- 256KB L2 Pipeline Burst Cache
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- 2.1GB ATA Hard Drive
- Zoom Video and USB Ports
- Stereo Speakers with 3D Surround Sound and Yamaha SW Wavetable
- Cardbus ready/Fast IR1.1
- 6.4 Pounds*

★ *Upgrade to 32MB SDRAM, add $199.*

$2999‡

Business Lease: $109/Mo., 36 Mos.
Order Code #800183

DELL LATITUDE LM M133ST
133MHz PENTIUM PROCESSOR w/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix TFT Display
- 16MB EDO RAM (72MB Max)
- 256KB L2 Pipeline Burst Cache
- 128-bit Graphics Accelerator with 64K Colors at 800x600
- 1.6GB Hard Drive
- Integrated 16-bit Stereo Sound
- IrDA 1.0 Std. Compliant
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★ *Upgrade to 40MB EDO RAM, add $299.*
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fastest 56-kbps model we've tested, beating the internal 3Com/U.S. Robotics Courier V.Everything by a nose.

The NetPacer is a good option if you need a very fast, ultralow-cost 56-kbps modem—as long as you have plenty of PC savvy and are prepared to shell out for another modem when the 56K standard comes along. But if you have technophobia, don't touch this one with a 10-foot telephone cord—it was by far the biggest headache of the bunch to install. The manual can be misleading, too: At one point it indicated that the modem was installed, even though we hadn't yet started the software phase of the installation. In fact, the NetPacer failed to install automatically on either of our two test PCs. And MaxTech's tech support failed to provide fast relief. Even when we made the toll call during the company's fairly limited support hours—12 hours per day, weekdays only—we got voice mail and didn't receive a callback until the next day.

The software bundle consists of Pacific Image Communications' SuperVoice 2.2, a fax/data package that also includes voice mail. But don't look for any extras in this decidedly clunky package.

MaxTech's current upgrade policy could be more reassuring. The company guarantees a free upgrade to the upcoming 56-kbps standard as long as it involves only software or firmware, and you'll have to pay shipping and handling for any firmware. MaxTech doesn't promise to swap modems, and that could be a real concern in the case of the NetPacer Pro: Of the 13 modems we tested, it's the only one to lack a software-upgradable digital signal processor, severely limiting its upgrade possibilities. *MaxTech, 800/936-7629, www.maxcorp.com*

READER SERVICE NO. 763

3Com/U.S. Robotics will **upgrade** its x2 **modems** to the **56-kbps** standard for **free,** shipping and handling **included.**

CARDINAL CONNECTA 56K INTERNAL FAXMODEM

PRO: Low price, smooth installation, free upgrade to 56-kbps standard

CON: Bare-bones, a little sluggish, weekday-only support calls are on your dime

Like 3Com/U.S. Robotics' internal Sportster, the Cardinal Connecta is a basic x2 modem that caters to the novice user. While this $149 unit is a lot cheaper than many modems on the chart, it falls short due to sluggish speed and Cardinal's weak support policies.

The Connecta did reasonably well on our 56-kbps ISP tests but ended up dead last in our 33.6-kbps tests, trailing the fast NetPacer Pro by nearly a half minute per megabyte of data transferred. If you plan to send large files regularly—say, e-mailing big spreadsheet documents between work and home—get something faster.

Installation went smoothly; the modem installed as a Plug and Play unit on both of our installation test PCs. The fax/data software bundle consists of FaxTalk Plus, among the dowdiest and least powerful of the packages we tested. Cardinal's upgrade ▶

Can You Do 56 kbps?

AFRAID THAT A 56-KBPS MODEM may not work out for you? You have reason. A lot of barriers can keep you from getting full speed out of one. But you'll be more likely to go the 56-kbps route successfully if you follow a few guidelines.

Before You Buy the Modem...

➤ Make sure your Internet service provider supports the 56-kbps standard that the modem you want is based on—x2 or K56flex. As of this writing, only 853 of the 4009 ISPs in the United States support either of these protocols.

➤ Just because an ISP supports a modem's standard doesn't necessarily mean it will give you a 56-kbps connection every time you dial in. Some ISPs have only one or two 56-kbps connection points, so communicating at 56 kbps could be a rare event. Ask your ISP how many 56-kbps connection points it offers.

➤ If you're on a PBX system (found in many offices), check to see if it supports 56-kbps connections. Many are not able to support rates higher than 33.6 kbps.

➤ If you have an older computer and you plan to attach an external modem to it, make sure the system has a 16550 UART chip. Virtually all PCs manufactured in the last few years have serial adapters with 16550 UARTs.

When You Buy the Modem...

➤ Make sure it comes with a money-back guarantee in case you want to return it. Most retailers offer a 30-day guarantee.

➤ Make sure your vendor guarantees a free upgrade to the eventual 56-kbps standard. Ideally, the upgrade should be free, even if it involves a hardware swap.

➤ Try to avoid that hardware swap by buying a modem with a RAM-based digital signal processor. A few K56flex units, such as the NetPacer Pro, have ROM-only DSPs, which severely reduce their chances of being upgradable to the upcoming 56-kbps standard.

If You Don't Seem to Be Connecting at 56 kbps...

➤ Make sure your serial port is set to the highest rate possible, usually 115.2 kbps. In Windows 95 you can adjust port settings by selecting *Start•Settings•Control Panel•System.* Select the *Device Manager* tab, double-click *Ports,* select the appropriate port, and then click the *Properties* button. If you have problems after changing the port rate, drop the setting a step.

➤ Check your phone wiring. Phone companies sometimes run two lines off a single terminal, a method known as multiplexing. Some multiplexed lines allow 56-kbps transmissions; most don't. Ask your phone company to give you a nonmultiplexed line.

➤ Reduce the number of devices hooked to the same phone line. If it's loaded with phones, fax machines, and other modems, the phone line's impedance could be altered enough to prevent 56-kbps connections.

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* We regret we cannot fulfill incomplete requests.

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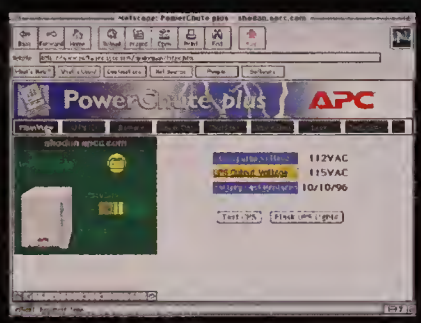
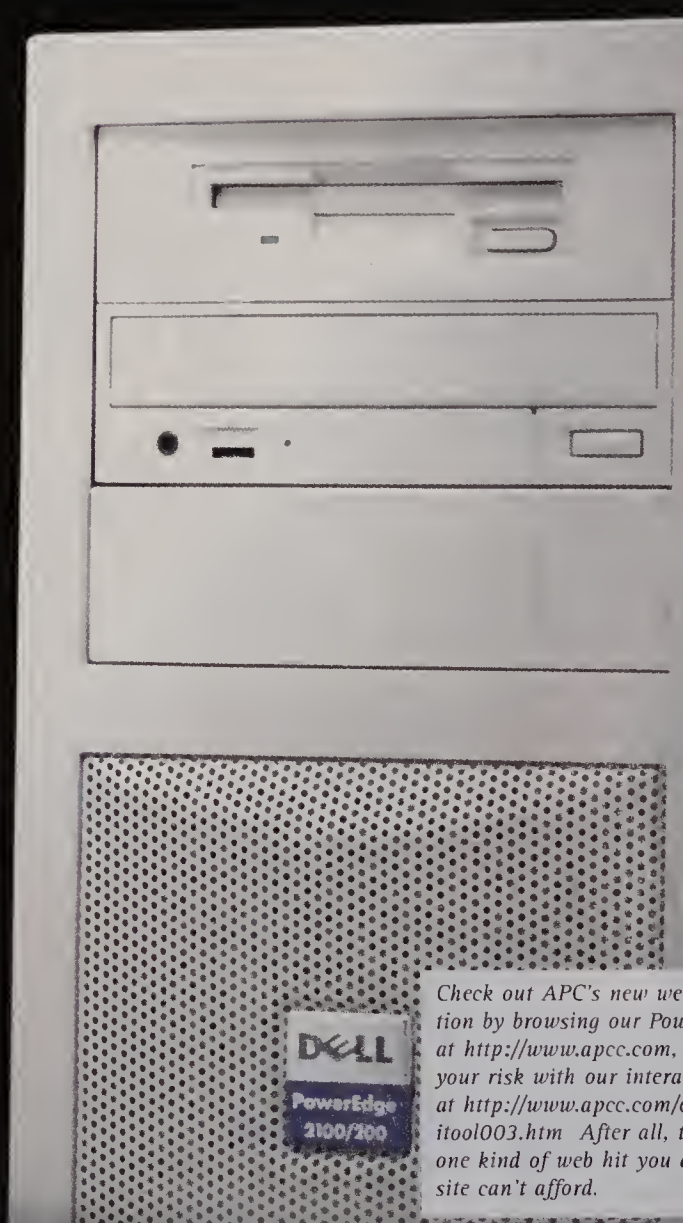
Instead of increasing your risk by waiting, join over 8,000,000 satisfied computer users worldwide who prefer APC to protect hardware and data.



Smart-UPS now ships with PowerChute plus power management software with WebAgent, to make Smart-UPS browser-manageable. (Ships free with 120V Smart-UPS only.)



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PC MAGAZINE EDITORS' CHOICE
November 19, 1996
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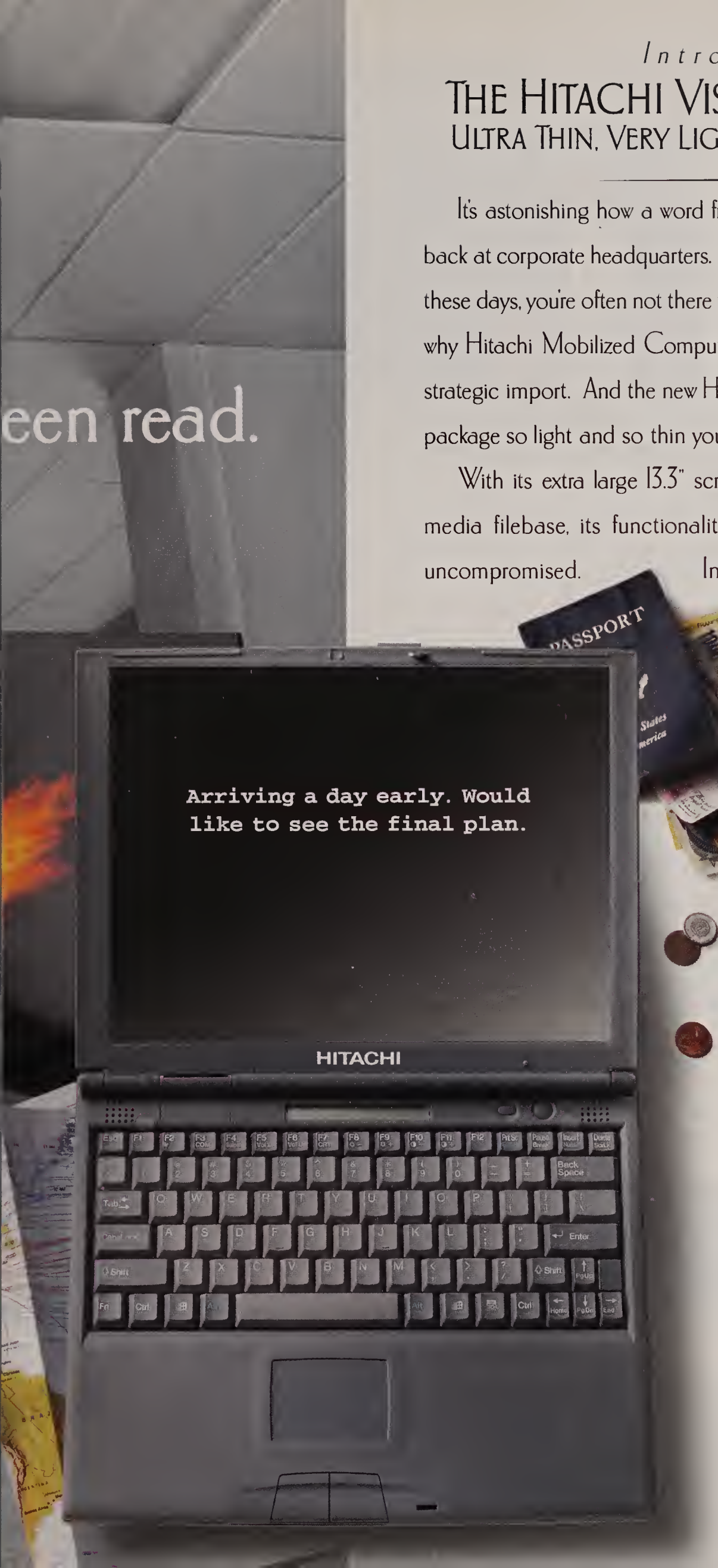

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policies are very good: Except for shipping and handling, the company will get customers up to the eventual 56-kbps standard for free even if it entails a modem exchange. The company also offers cross-ship replacement, a must should the Connecta fizzle during a critical task. Otherwise, however, Cardinal's support is a bit stingy—reps are available only 12 hours per day on weekdays only, and you have to pay for the call. *Cardinal, 800/775-0899, www.cardtech.com*

READER SERVICE NO. 764

3COM/U.S. ROBOTICS SPORTSTER 56K FAXMODEM INTERNAL

PRO: Nice features, fine software bundle, free upgrade to 56-kbps standard

CON: Fairly expensive, tech support requires a toll call, installation is a little spotty

8 According to 3Com/U.S. Robotics, its Sportster modems are fine for the casual user who needs hand-holding to get up a and running. But IBM's 56K Modem Internet Kit, our internal Best Buy, is a better fit for novices. It costs $50 less than the $199 internal Sportster, is easier to install, and comes with more features.

The Sportster's strongest suits are its software bundle and the company's upgrade policies. In addition to the RapidComm package—which offers solid data communications tools and better-than-average fax features—the modem comes with more than a dozen other programs, including Stampede Remote Office and the Iris antivirus utility. And 3Com/U.S. Robotics offers the best upgrade policy we've seen: The company will upgrade current 56-kbps modems for free even if it means swapping them, and it will absorb the shipping and handling costs.

In several respects, however, the Sportster falls short. Plug and Play should be the factory default, but in our tests we had to reset jumpers on the modem to allow it to install automatically. Once the jumpers were set, the modem installed itself cleanly on one of our test PCs but failed on the other. The Sportster was uninspired in overall performance too, lagging behind the fastest modems by 20 seconds per megabyte of data received in our 56-kbps ISP tests. Casual users needn't care, but if you spend all day on the Net, those wasted seconds will add up.

Support policies are a little meager: The 10-hours-a-day, weekday-only support is not toll-free, and there's no cross-ship replacement should the Sportster die. *3Com/U.S. Robotics, 800/877-2677, www.3com.com*

READER SERVICE NO. 765

EASY SOFTWARE ACCESS: 3Com/U.S. Robotics puts all software onto one CD-ROM and includes a handy menu to get to it all.

External Modems

3COM/U.S. ROBOTICS SPORTSTER 56K FAXMODEM EXTERNAL

PRO: Thoughtful design, good features, nice software bundle, free upgrade to 56-kbps standard

CON: Expensive

1 The Sportster 56K Faxmodem External gave us none of the installation headaches of its internal sibling and was noticeably faster than that model in our 56-kbps tests. Despite its relatively high $219 price, it ranked highest among all the external modems we examined. In our 56-kbps tests, this x2 modem almost matched the NetPacer Pro for the fastest download time among the tested modems. The unit is also intelligently designed, with a volume-control dial on the side and plenty of status LEDs across the front. Finally, the software bundle is first-rate. The supplied CD-ROM contains the same generous set of programs and utilities found with the internal Courier model (except for Stampede Remote Office). We found RapidComm among the easiest of the bundled packages to use.

When the final 56-kbps standard becomes available, 3Com/USR guarantees that its current 56-kbps customers will get an upgrade for free. If a modem swap is required, the company will even absorb the shipping and handling costs. *3Com/U.S. Robotics, 800/877-2677, www.3com.com*

READER SERVICE NO. 766

> Like its **internal** sibling, the $169 Zoom FaxModem 56Kx is a **fast, no-frills** unit that's **affordably** priced.

ZOOM FAXMODEM 56KX

PRO: Low price, long support hours, cross-ship replacement, good-quality software bundle, free upgrade to future 56-kbps standard

CON: Few extras

2 Like its internal sibling, the $169 Zoom FaxModem 56Kx is a fast, no-frills unit that's affordably priced. But unlike the internal Zoom, this K56flex modem is relatively easy to install. While it lacks the more advanced voice features that would lend it appeal to small- and home-office users, the 56Kx should be your top choice if you're looking for an external modem to get on the Net cheaply and almost effortlessly.

The FaxModem 56Kx did well on our test PCs. Our only snag was in finding the driver—it turned up on the fax/data program disk. You won't find software-stuffed CDs in the modem box, but the software that you do get is good. COMit handles data communications in both Windows and DOS, while WinFax Lite and DOSFax Lite pick up the faxing chores. We especially liked the WinFax package's ease of use, although this Lite version lacks some of the best features of the full version, such as a cover-page designer and the abilities to annotate faxes and forward them.

Zoom's support is not toll-free, but ▶

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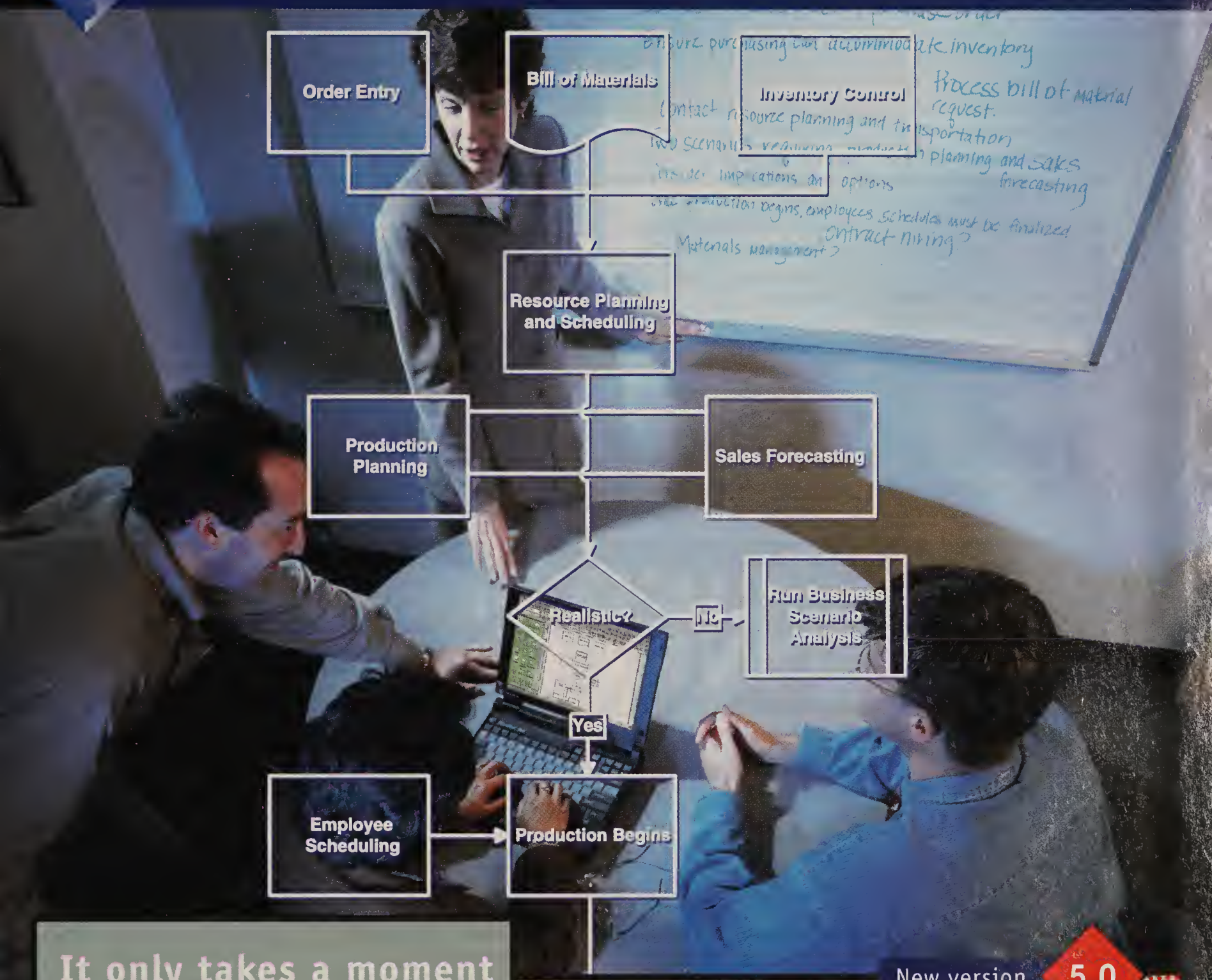

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we appreciated the company's generous 14.5-hours-a-day support, including Saturday. Zoom also guarantees a free upgrade to the eventual 56-kbps standard, but you'll have to pay a $19 shipping and handling charge if it involves a modem swap. *Zoom Telephonics, 800/631-3116, www.zoomtel.com*

READER SERVICE NO. 767

DIAMOND MULTIMEDIA SUPRAEXPRESS 56E

PRO: Very low price, compact design, strong software bundle, long support hours

CON: Thin feature set, few status indicators, free upgrade plan excludes modem swap

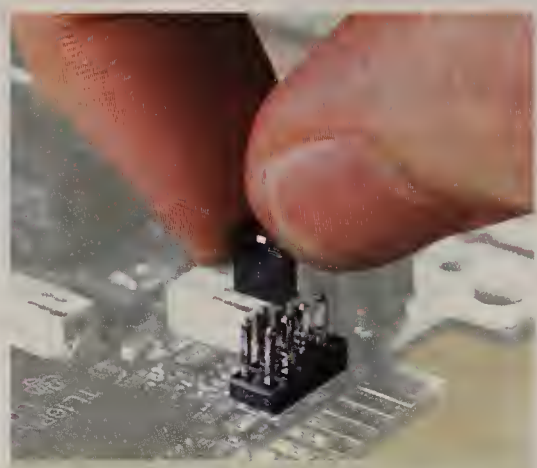
3 If you're looking for a highly portable K56flex modem that offers the convenience of fast connections for both notebook and desktop PCs, the SupraExpress 56e is an excellent candidate. It's one of the smallest and lightest external units we've seen, measuring and weighing less than the AC adapters found on many notebook PCs. And at $140 it's very cheap. It also comes with a built-in serial cable, so that's one less component to lug around. But if you damage the cable, you'll have to return the whole unit for repair.

Some design drawbacks kept the SupraExpress off the Best Buy track. Not only does this modem forgo common extras such as distinctive ring and Caller ID, but it's given up a few staples as well. For example, only four status lights are on the front panel—on hook, send data, receive data, and power—and the labels on the lights are so small that they're nearly impossible to read. The modem also lacks rubber feet to help keep it from sliding off your desk.

The supplied CD-ROM contains a passel of supplemental software, including Adobe Acrobat Reader, COMit, FaxTalk Plus, Internet Explorer, and a WarCraft II game demo. COMit is decent for data communications, but FaxTalk Plus has just the basics—you'll want something more if you spend much time sending and receiving faxes on your computer.

On the plus side, Diamond offers extended technical support hours—14 hours Monday through Friday and 8 hours on Saturday—though it's a toll call. However, the company currently doesn't offer a modem swap, should that be necessary, in its free upgrade plan for the forthcoming 56-kbps standard. *Diamond Multimedia, 800/727-8772, www.diamondmm.com*

READER SERVICE NO. 768



SOME MODEMS, such as the Sportster internal, may require you to set jumpers.

MOTOROLA ISG MODEMSURFR 56K DESKTOP DATA/FAX MODEM

PRO: Affordable, distinctive ring and Caller ID, toll-free support, free upgrade to 56-kbps standard

CON: Short support hours, installation a tad rough

4 This external version of Motorola's ModemSurfr board suffers from the same drawback as the internal unit: brief 9-hours-per-weekday tech support. In addition, the $179 external ModemSurfr turned out to be fussier to install. We had no problem on our test PC with an Award BIOS; but the system with an AMI BIOS didn't recognize the new modem during boot-up, so we had to run the Install New Modem option from Windows' Control Panel. To make matters worse, the PC installed it as 'Standard Modem', a generic setting that often does not take full advantage of the device's power. We finally found the proper driver on the supplied CD-ROM and were able to get the modem up and running. Someone new to this process would almost certainly have to call support.

> Diamond's SupraExpress 56e is a **very portable modem** that connects quickly to both **desktop and notebook** PCs.

Physically, the ModemSurfr is small, light, and appealing. The unit comes with nonskid pads to keep it from sliding off the desk, and its six status lights are well marked. Like its internal sibling, the ModemSurfr 56K Desktop supports distinctive ring and Caller ID.

The same solid software bundle is inside this package as in the ModemSurfr 56K Internal. Trio Communications Suite 5.1's innovative graphical interface puts a fun gloss on what is really a powerful set of fax and data communications tools.

Motorola guarantees its current customers a free upgrade when the official 56-kbps standard emerges—including a trade-in if necessary. *Motorola ISG, 800/566-3266, www.mot.com/modems*

READER SERVICE NO. 769

HAYES ACCURA 56K EXTERNAL FAX MODEM

PRO: Attractive design, easy installation, free unconditional upgrade to 56K standard

CON: Sluggish in 56-kbps tests

5 The $189 Accura 56K External is the latest entry in Hayes's line of consumer modems. The company tailored this unit for the Net with Quarterdeck's Internet Suite 2 and WebTalk, in addition to Hayes's own SmartCom fax/data package.

When it comes to the Web, however, this K56flex modem is a plodder. It trailed the NetPacer Pro in the 56-kbps download tests by over half a minute per megabyte, making it the slowest modem on the chart. The bundled Internet software is out-of-date—we recommend downloading the latest version of Microsoft Internet Explorer or Netscape Navigator. And SmartCom is tougher to use than some popular bundles, including QuickLink and Trio Communications Suite. Minus its trimmings, the Accura is a plain fax-modem—no voice capabilities, no security features.

In its favor, a clean Plug and Play setup makes the Accura a cinch to install, and Hayes guarantees a free upgrade to the future 56-kbps standard, even if it means returning the modem for a new one. If you want to buy a Web modem now, however, we recommend the Zoom FaxModem 56Kx: It's faster, costs $20 less, and is backed by much better support than the 10-hours-per-weekday support that Hayes offers. *Hayes Microcomputer, 800/377-4377, www.hayes.com*

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MORE!

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You Want Fast, Awar

...we give you the Micron™ TransPort™ XKE!

When you need more portable power, the Micron TransPort product team charges ahead with (clockwise from bottom left): Julia, Drew, Bill, Jeff, Jeff, Andrew and Kim.

MMX™ intel inside pentium® PROCESSOR

-Winning Portables

The speediest portable line-up.

Imagine one of the world's fastest portable computers just got faster. That's what happened when Micron took the award-winning TransPort XKE 166MHz portable and gave it a big boost with Intel's 200MHz or 233MHz Pentium® processor. Now the XKE 166 has topped itself. And you'll notice the difference.

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Micron is the only place you'll find portables standard with a voice recognition system — included on all TransPort XKE models. Now you can create documents and look up words by talking to your computer. Just speak naturally and watch as sentences appear on your screen. And you can upgrade our TransPort XPE and VLX models to include voice recognition.

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You'll be in awe of the brilliant image on the TransPort's active-matrix screen display, enhanced by a high-performance graphics accelerator. Other great features include a swappable floppy drive and CD-ROM drive, You also have a choice of the Microsoft® Windows® 95 or Windows NT® operating system pre-installed.

Our TransPort team has a notebook for everyone. Call today and ask about our XKE and XPE models, or the value-packed TransPort VLX starting at just $2,249.

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Packed Performer

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The Micron Millennia desktops tout the industry's highest awards for screaming performance and feature-packed configurations, making them the envy of our competitors.

Choose the Millennia XKU and you'll get an Intel Pentium® II processor with MMX™ technology. Not to mention an AGP-powered graphics for top-notch 3D performance, along with MPEG and 24X EIDE CD-ROM drive.

Your choice of incredible software packs!

Now when you buy a Micron Millennia, you can pick one of four software packs to be included with your system. Choose from the Quicken Financial Pak, the EdVenture Pak, Multimedia Xcitement Pak, or the Home Productivity Pak. Pay only $69 for each additional pack you choose.

Included Zip drives.

The entire Millennia family comes standard with a 100MB Iomega Zip drive — giving you virtually unlimited storage! And you can easily transport files from home to work, saving and using multimedia files and applications. A Zip drive also gives you a built-in backup system for your computer.

Giving it a boost with Fusion 3D™.

Upgrade your Millennia system with Fusion 3D and you'll get a DVD drive, incredible 3D graphics, AWE 64 ISA sound card, a two-speaker satellite with a subwoofer, an exciting game bundle and a Microsoft® SideWinder joystick. You won't believe how your games and multimedia applications spring to life like never before!

How did the Millennia get so good? With the help of Micron's Consumer Products team left to right: Bob, Jon, Lori, Jeff, Tina, Christy, Rich, and Casey.

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You Ask For Serious

... we introduce Micron™ Vetix™ servers and the ClientPro® MRE!

MMX™ intel inside pentium® PROCESSOR

Business Solutions

Our Server and ClientPro Product groups mean big business. They are (clockwise from bottom): Amber, Jody, Tracey, Rex, Rob, Amanda and Todd.

Servers that meet your tough standards

Micron™ Vetix LXI and MXI servers deliver expandable and dependable networking at prices that are hard to beat. And now they're even easier to set up.

The Vetix MXI server allows you to effortlessly manage your network with redundant power supplies and high-degree, fault-tolerant components including hot-swappable hard drives. And you're supported by our 24-hour technical support team or optional on-site service from Digital Equipment Corporation.

These award-winning Vetix servers are custom configured and backed by one of the best limited warranties in the business.

ClientPro® — there to take the challenge.

Micron's dependable ClientPro systems are network-ready and can handle all your business computing tasks. These powerful desktop PCs are designed to be easy to set up and upgrade. Choose our new ClientPro MRE and usher in the next era of manageability. It's wired for management with new features like LANDesk 3.1 and Wake on LAN adapters, giving you the ability to remotely manage your system. You'll also get chassis intrusion alert for security protection. And because the ClientPro incorporates proven MMX™ technology, you'll know your ClientPro system will grow with you.

Micron's server and client product teams always bring you complete networking solutions. And you'll get Micron's award-winning customer service, 24-hour technical support, and a limited warranty that's hard to beat.

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You Want A Workstation To Beat All Others

... we present the Powerdigm™ XSU with Micron-engineered technology!

Micron innovation at its best.
Revolutionizing workstation performance, Micron introduces our exclusive Samurai™ chip set on the Powerdigm XSU workstation. A powerful, Intel processor-based workstation the Powerdigm XSU will execute your most demanding business and technical tasks — and it's flexible enough to run the most popular PC programs.

Engineered and developed by Micron, the Samurai chip set is the first to offer a 64-bit PCI bus, in a system based on the Intel architecture. The Samurai chip set enables greater bandwidth for engineers, graphic designers and technical professionals who demand maximum throughput from their workstations and integrated peripherals.

Micron's workstation team makes sure your needs are covered. So the Powerdigm workstation supports dual monitors, dual Pentium II processors, multiple ultra-wide SCSI-3 hard drives and 10/100 network adapters. The Fire GL video cards offers no-compromise 3D performance and Jaz drives are standard on both the XSU and XLI Powerdigm models.

It's also hard to beat the industry-leading Micron Power limited warranty and our award-winning customer service and support. Call today and find out more about the Powerdigm XSU and XLI workstations.

Making it the workstation to beat are Powerdigm team members, left to right, Stephanie, Terry and John.

MMX™ intel inside pentium® II processor

Business Solutions

Vetix™ LXI

Intel 200MHz Pentium Pro processor
64MB ECC EDO RAM
4GB Ultra-Wide SCSI-3 hard drive

STANDARD FEATURES
Dual Intel Pentium® Pro ZIF sockets
256KB integrated L2 cache
Memory upgradeble to 1GB (8 DIMM slots)
5 PCI, 2 ISA, 1 shared ISA/PCI, 9 drive bays
Integrated Adaptec PCI Ultra-Wide SCSI-3 controller
Integrated Intel EtherExpress™ Pro 100 controller
12X variable speed SCSI-2 CD-ROM drive
15" Micron 500FGx, .28dp (13.7" display)
Microsoft Windows NT Server 4.0 (10-user license)
Intel LANDesk Server Manager 2.52
Dedicated server technical support, 7x24
5-year/3-year Micron Power℠ limited warranty
1-year next-business-day on-site service***
NOS Support (3 incident resolutions/1st year), 7x24

$5,099
Bus. Lease $160/mo.

Vetix MXI

Intel 200MHz Pentium Pro processor
256KB integrated L2 cashe
128MB ECC EDO RAM Three 4GB Ultra-Wide SCSI-3 hard drives (12GB total)

STANDARD FEATURES
Dual Intel Pentium Pro ZIF sockets
Memory upgradeble to 1GB (8 DIMM slots)
8 open expansion slots: 5 PCI, 2 ISA, 1 shared ISA/PCI
Integrated Adaptec PCI Ultra-Wide SCSI-3 controller
Integrated Intel EtherExpress™ Pro 100 controller
12X variable speed SCSI-2 CD-ROM drive
5 internal, hot-swappable, hard drive array bays (upgradable to 10)
3 external 5.25" media bays
1(one) 330 watt power supply standard (upgradable to 3 for added redundancy)
Microsoft Windows NT Server 4.0 (10-user license)
Intel LANDesk Server Manager 2.52
Dedicated server technical support, 7x24
5-year/3-year Micron Power℠ limited warranty
1-year next-business-day on-site service***
NOS Support (3 incident resolutions/1st year), 7x24

$7,999
Bus. Lease $251/mo.

ClientPro® VXE

Intel 166MHz Pentium processor with MMX™ technology
16MB EDO RAM, support for SDRAM
1.2GB SMART EIDE hard drive
15" Micron 500Lx, .28dp (13.7" display)

512KB pipeline burst cache, flash BIOS, DMI 2.0
3Com 3C509 ISA Ethernet T-P NIC
16X EIDE variable speed CD-ROM drive
S3 ViRGE graphics accelerator, 2MB EDO RAM
Microsoft Mouse
Microsoft Windows® 95
5-year/3-year Micron Power limited warranty

$1,449
Bus. Lease $49/mo.

ClientPro MRE

Intel 200MHz Pentium processor with MMX technology
32MB SDRAM
2.1GB Ultra ATA SMART EIDE hard drive
15" Micron 500Lx, .28dp (13.7" display)

512KB pipeline burst cache, flash BIOS, DMI 2.0
Intel Pro/100 with Wake On LAN Network Adapter
16X EIDE variable speed CD-ROM drive
S3 ViRGE graphics accelerator, 2MB EDO RAM
Microsoft Mouse
Microsoft Windows 95
Intel LANDesk Client Manager
5-year/3-year Micron Power limited warranty

$1,749
Bus. Lease $60/mo.

ClientPro XLU

Intel 266MHz Pentium II processor with MMX technology
32MB EDO RAM
2.1GB SMART EIDE hard drive
17" Micron 500FGx, .28dp (13.7" display)

512KB internal L2 secondary cache, DMI support
3Com PCI 10/100 ethernet NIC
16X EIDE variable speed CD-ROM drive
PCI 64-bit 3D video, MPEG, 4MB EDO RAM
Upgradable wavetable audio with speakers
Microsoft Intellimouse™
Microsoft Windows NT Workstation
Intel LANDesk Client Manager
5-year/3-year Micron Power limited warranty

$2,649
Bus. Lease $90/mo.

***On-site service for Vetix LXI and Vetix MXI server is provided by Digital Equipment Corporation and is optional.

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Performance Desktop Solutions

Millennia® MME

STANDARD FEATURES
512KB pipeline burst cashe, flash BIOS
Integrated 100MB Iomega Zip drive, 3.5" floppy drive
24X variable speed EIDE CD-ROM drive
32 voice wavetable stereo sound with AV009 speakers
USR Sportster 56K x2 data/fax modem*
PCI 64-bit 3D video, MPEG, 4MB EDO DRAM
Microsoft® Intellimouse™, USB connections
Microsoft Windows® 95 and MS® Plus!, Microsoft Office 97 Special Business Edition
Choice of Micron Software Solutions Pak
5-year/3 year Micron Power℠ limited warranty

Millennia MME 166

Intel 166MHz Pentium® processor with MMX™ technology
16MB SDRAM
3.2GB Ultra ATA hard drive
15" Micron 500FGx, .28dp (13.7" display)

$1,699
Bus. Lease $58/mo.

Millennia MME 200

Intel 200MHz Pentium processor with MMX technology
48MB SDRAM
4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$2,249
Bus. Lease $77/mo.

Millennia MME 233

Intel 233MHz Pentium processor with MMX technology
64MB SDRAM
6.4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$2,599
Bus. Lease $89/mo.

Micron Software Solutions Paks

Quicken Financial Pak: Quicken Deluxe, Family Lawyer, Parent's Guide to Money, Financial Planner†

EdVenture Pak: Includes children's educational and entertainment software, age 3-10†

Home Productivity Pak: Family Doctor, Comptons Encyclopedia 1997, Mavis Beacon Teaches Typing, Printshop Ensemble 3, Net Nanny, Crayola Magic 3D†

Multimedia Xcitement Pak: Includes great multimedia titles the whole family will love! Call for details on titles.

Millennia XKU

STANDARD FEATURES
82440LX chipset
512KB internal L2 cashe, 2MB BIOS
Integrated 100MB Iomega Zip drive, 3.5" floppy drive
24X variable speed EIDE CD-ROM drive
32 voice wavetable stereo sound with Advent 009 speakers and subwoofer
USR Sportster 56K x2 data/fax modem*
Diamond Viper V330 128-bit 3D video with 4MB SGRAM
Microsoft Intellimouse, USB connections
Microsoft Windows 95 and MS Plus!, Microsoft Office 97 Special Business Edition
Choice of Micron Software Solutions Pak
5-year/3 year Micron Power limited warranty

Millennia XKU 266

Intel 266MHz Pentium II processor (features MMX technology)
64MB SDRAM
6.4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$3,099
Bus. Lease $106/mo.

Millennia XKU 300

Intel 300MHz Pentium II processor (features MMX technology)
128MB SDRAM
8.4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$3,999
Bus. Lease $136/mo.

Fusion 3D Option Pak

DVD-ROM, **DVD software
E4 Cool DVD PCI decoder card: 6 channel AC-3 to 2 channel out capability, SPDIF output (digital audio out)
AWE 64 ISA sound card
Cambridge SoundWorks/MicroWorks - 2 speaker satellite with subwoofer stereo system
Monster 3D graphics card with 4MB memory
Fusion 3D game pak: Mech Warrior 2: Mercenaries 3Dfx version, AH-64 Longbow, U.S. Navy Fighters '97, Command & Conquer, Formula 1 3Dfx Edition
MS Sidewinder™ Pro Joystick

MME add $699
XKU add $549

**The DVD ROM drive will be removed upon the purchase of the DVD upgrade

Portable Solutions

Micron TransPort™ VLX

133MHz Intel Pentium processor
16MB EDO RAM (40MB max.)
1.4GB hard drive
16X modular CD-ROM drive
Li-Ion battery
12.1" TFT SVGA, 800x600 display
256KB L2 pipeline burst cache
PCI bus with 128-bit graphics accelerator
MPEG compatible
Zoomed video-ready
Touchpad pointing device
Microphone and 16-bit stereo sound
2-way infrared port
Modular floppy drive
Microsoft Windows 95 and MS Plus!
5-year/1-year Micron limited warranty

$2,249
Bus. Lease $77/mo.

Micron TransPort XKE

STANDARD FEATURES
512KB pipeline burst cache
128-bit, 2MB DRAM graphics
20X modular CD-ROM drive with AutoPlay™ technology
Pick-a-Point dual pointing devices
Microphone and 16-bit stereo sound
Integrated 33.6 Kbps modem, full duplex
CardBus- and zoomed video
2 infrared ports, S-video, NTSC, game and MIDI port
Management and Executive Travel software pak
2 modular expansion bays
Dragon System NaturallySpeaking voice recognition software
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
5-year/3-year Micron Power limited warranty

Micron TransPort XKE 200

200MHz Mobile Intel Pentium processor with MMX technology
48MB EDO RAM
3GB removable hard drive
13.3" TFT XGA display

$5,699
Bus. Lease $178/mo.

Micron TransPort XKE 233

233MHz Mobile Intel Pentium processor with MMX technology
48MB EDO RAM
3GB removable hard drive
13.3" TFT XGA display

$5,949
Bus. Lease $187/mo.

Micron TransPort XPE

STANDARD FEATURES
256KB pipeline burst cache
PCI graphics accelerator, 2MB VRAM
8X modular CD-ROM drive
Pick-a-Point™ dual pointing devices
Microphone and 16-bit stereo sound
Motorola Montana 33.6 fax/modem
CardBus- and zoomed video-ready
2 infrared ports, S-video, NTSC, game port
Management and Executive Travel software pak
2 modular expansion bays
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
5-year/3-year Micron Power limited warranty

Micron TransPort XPE 133

133MHz Mobile Intel Pentium processor with MMX technology
16MB EDO RAM (80MB max.)
1.6GB removable hard drive
12.1" active matrix color display, 800x600

$2,999
Bus. Lease $102/mo.

Micron TransPort XPE 150

150MHz Mobile Intel Pentium processor with MMX technology
32MB EDO RAM (80MB max.)
1.6GB removable hard drive
12.1" active matrix color display, 800x600

$3,299
Bus. Lease $112/mo.

Micron TransPort XPE 166

166MHz Mobile Intel Pentium processor with MMX technology
32MB EDO RAM (80MB max.)
2.1GB removable hard drive
12.1" active matrix color display, 800x600

$3,599
Bus. Lease $123/mo.

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STANDARD FEATURES
12/20X variable speed SCSI CD-ROM drive
4GB Ultra-Wide SCSI-3 hard drive
Supports multiple IDE Ultra ATA and Ultra-Wide SCSI-3 hard drives
DMI, software and hardware management support
Iomega Jaz SCSI drive with 1GB removable cartridge
Wavetable stereo sound with speakers
Fast Ethernet 10/100 PCI network adapter
Microsoft Intellimouse
Microsoft Windows NT Workstation
19" Hitachi SuperScan CM751(18" display) .26dp color monitor
Optional support for dual monitors
5-year/3 year Micron Power limited warranty

Powerdigm XLI

Dual Intel 200MHz Pentium Pro processors
64MB ECC EDO RAM
Memory upgradable to 512MB ECC EDO RAM
Number Nine Revolution 3D video card, 4MB WRAM

$4,899
Bus. Lease $167/mo.

Powerdigm XSU

Samurai™ Chip set
Dual Intel 300MHz Pentium II processors
64MB ECC SDRAM
Memory upgradable to 1GB ECC SDRAM
Fire GL 1000 pro 8MB 66MHz PCI Open GL Professional 3D accelerators

$6,199
Bus. Lease $195/mo.

Call our sales team today! Left to right: Felice, Brian, Fred, Justin, Bruce and Ron.

Other Systems Options

MultiMedia Options

AWE 64 ISA Sound Card upgrade	$99
Advent AV370 Powered Pattners stereo speakers with subwoofer	$199
Microsoft SideWinder 3D Pro joystick	$59
Microsoft SideWinder gamepad	$39

Storage/Media Options

Adaptec 2940U Ultra SCSI Fast-20 controller (upgrade from system with standard Ultra SCSI Fast-20 controller)	$100
Plextor 12/20 Plex 3MB/sec SCSI internal CD-ROM drive[1] (upgrade from system with standard EIDE CD-ROM drive)	$100
Iomega Jaz SCSI drive with 1GB removable cartridge[1]	$299
Iomega ZIP IDE drive with 100MB removable cartridge	$99
Iomega 6-pack of 100MB Zip cartridges	$99
Iomega 3-pack of 100MB Zip cartridges	$49
Sony 4/8GB SCSI DDS-2 tape backup drive with tape and software[1]	$899
Cheyenne ARCserver with InocuLAN	$499

Display/Video Options

17" Hitachi SuperScan CM630 (15.9" display) .26dp monitor[2]	$100
19" Hitachi SuperScan CM751 (18" display) .26dp monitor[2]	$300
21" Hitachi SuperScan CM801 (20.0" display) .26dp monitor[2]	$650

Software Options

Small Business Essentials: QuickBooks, Visio, Norton AntiVirus, Astound, Focal Point, American Yellow Pages	$249
CorelDRAW 7 (full retail version)	$299
Corel WebMaster Suite (full retail version)	$99

HP Printers

HP DeskJet 692c printer	$319
HP DeskJet 870Cxi printer	$419
HP LaserJet 6Lxi printer	$429
HP LaserJet 6P printer	$799

Scanner Options

HP Scanjet 5s sheetfed scanner	$209
HP Scanjet 5p flatbed scanner	$309
HP Scanjet 6100C	$799

Communication Options

33.6 external data/fax modem	$299
56Kbps technology modem* upgrade	$99

Server Extended Service Options

2nd and 3rd year next-business-day on-site service coverage[4]	$99
4-Hour response[5] on-site service coverage[4] (8am - 5pm, M-F), 3 year	$798
4-Hour response[5] on-site service coverage[4] (24 hours, 7 days per week), 3 year	$998
Other service options may be available, ask your system consultant	

Extended Desktop Service Options

Optional 1st year on-site service[3] coverage included	
2nd year on-site service[4] coverage	$79
2nd and 3rd year on-site service[4] coverage	$99
Other service options may be available, ask your system consultant	

Extended VLX Notebook Service Options

2nd and 3rd year parts and labor; 3-business-day turnaround for 3 years[4]	$269
2nd and 3rd year parts and labor; 7-business-day turnaround for 3 years[4]	$209

TransPort Options

Micron Executive™ desktop package: matching black 17" monitor (15.8" display), mouse, mousepad and keyboard (can be used with or without MicronDock. Available on XKE and XPE models only.)	$699

Other Options

APC Per7T surge suppressor	$39
APC Pro7T surge suppressor	$59
Microsoft Natural Keyboard (upgrade from standard keyboard)	$49

Requires SCSI host adapter
[2] Upgrade from systems with standard Micron 17" 17FGx color monitor
[3] 1st year on-site service is available in the United States and in limited areas in Canada from third-party service provider per customer's agreement with provider
[4] 2nd year and 2nd and 3rd year offerings are available in the United States only
[5] Service will be scheduled whenever possible, for the next business day after parts are received by the customer
[6] Available in certain locations, ask your system consultant for details
Some options and accessories available with system purchase only

*Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.

Available only on Millennia systems with Microsoft Windows 95

MICRON POWER™ WARRANTY

5-year limited warranty on microprocessor and main memory
3-year limited parts-only system warranty (1-year for TransPort VLX)
1-, 2- or 3-year optional on-site service agreement for Micron desktop and server systems
30 days of free Micron-supplied software support for Micron desktop systems; 3 optional network operating system incident resolutions included for Micron server systems
30-day money back policy
24-hour technical support

The foregoing is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron.

Micron Sales Hrs: Mon-Fri 6am-10pm, Sat 7am-5pm (MT) Technical Support Available 24 Hours A Day, 7 Days A Week
Toll free from Mexico: 95-800-708-1755
Toll free from Canada: 800-708-1758
Toll free from Puerto Rico: 800-708-1756
International Sales: 208-893-8970
International Fax: 208-893-7393

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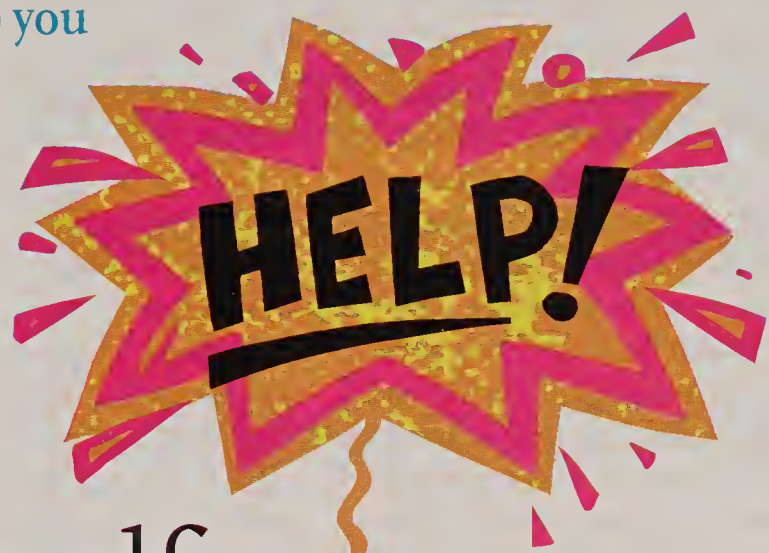
Manuals suck. Tech support bites. But a flood of CD-ROMs, videotapes, and books claim to help you learn Windows 95 and popular applications. Are they worth your time and money?



do-it-yourself training

Admit it: You need help. That new powerhouse office suite you just purchased can do everything but lock the doors at night—but you still manually copy and paste client lists from your ▶

BY DAVID ENGLISH

ILLUSTRATIONS BY ROBERT ZIMMERMAN

spreadsheet to your word processor. You've got 500MB worth of feature-laden software and yet nothing has changed.

It's not that you haven't tried. You used the built-in help system, asked the geek down the hall—you even slogged through the product manual. Now you're frustrated and angry. What's the point of having a powerful application if you can't make it do what you want?

The fact is, most of us live by what software companies call the 80/20 rule: 80 percent of the people use only 20 percent of an application's features. Want to see how the other 80 percent of your application works? A small investment in a software training product, such as a book or a CD-ROM, can break the feature logjam. In this review we look at the products that can help you get the most out of your PC.

Recommended

WHEN IT COMES to mastering applications, nothing works better than CD-ROM. Packed with video, audio, and animation, disc-based products even let you practice within the applications. Easy Tutor: Learn Office 97, a CD-ROM from CRT Multimedia, shone as the best training tool for Excel 97 and proved best overall among our nine contenders. The most effective Win 95 training option was Expert Software's Windows 95 Personal Tutor CD-ROM, which also bested tape and print. Still, books can compete: In our Photoshop showdown, Adobe Press's *Classroom in a Book: Adobe Photoshop 4.0* edged out Software Made Easy: Adobe Photoshop 4.0, a CD-ROM from Personal Training Systems.

SMART MONEY

DOES TRAINING WORK? Ask Paul Johnston, an analyst for research firm IDC, who performs ROI (return on investment) analyses for corporations wanting to quantify the results of their training programs. Johnston couldn't reveal his findings for individual clients, but he was willing to generalize about the returns that companies can expect. "It's not a 30 percent or 80 percent return; it's more like hundreds of percentage points of return—as high as 400 percent or 500 percent," he says.

His reasoning goes like this: When Joe stops to ask Sue a question about Excel, that's two employees who are taken from their work, at about $100 an hour when you consider salary, benefits, overhead, office space, and office equipment. Only 3 hours of this adds up to $300; you could spend that much on training and get a lot more for your money. "And that's before you even get into issues of quality—actually doing the work better, not just faster," says Johnston.

Things get out of hand when employees call the company's internal support staff, often known as a help desk. The help desk rep ends up acting as a personal PC trainer—to the tune of $75 to $150 per hour per person. In fact, when you read about total cost of PC ownership, much of that money goes toward help desk operation.

Training can benefit individuals and corporations alike. Home and small-office workers can significantly boost productivity and the quality of their work. Small businesses in particular may benefit from the sophisticated, professional look that advanced software features can provide.

TRAINING TOP TO BOTTOM

FOR INDIVIDUAL USERS, picking the best training method usually comes down to two factors: How do you prefer to learn, and what do you need to master? Clearly, a beginner will want very different tools from an advanced user concentrating on a project. It's no surprise that prices vary, ranging from $0 to $300 and up.

The least expensive option is simply to read the manuals and use the on-screen help system. Unfortunately, vendor documentation can be inadequate. In most cases, bundled documentation is best used as a reference. And even the best on-screen help systems often lack the structured approach needed to master an application quickly.

That said, the help systems bundled with the latest applications are getting very sophisticated. Microsoft Office 97's help is crossing the line from simple on-screen documentation to being a "performance support system," says Elliott Masie, president of The Masie Center, a training-industry consulting firm. "It doesn't just teach you how to use Excel, it actually helps you use Excel." However, few help systems are that far along.

So where do you turn for help? Books are the most popular training medium,

Which Way Should You Train?

Individual and corporate users have many options for mastering software.

TRAINING TOOLS	Comments
Manuals $0	PRO: No extra cost, useful anywhere. CON: Often poorly organized.
Web-based training $5 to $795	PRO: Easily accessible. CON: Slow data transfers, unproven.
Books $15 to $90	PRO: Inexpensive, useful anywhere, good for reference. CON: Quickly outdated, bulky.
CD-ROMs $15 to $300	PRO: Interactive, fast data transfers, good for self-teaching. CON: Quickly outdated.
Network-based training $20 to $300	PRO: Interactive, can be cost-effective. CON: Usually slow data transfers.
Videotapes $30 to $100	PRO: Practically everyone has a VCR. CON: Not interactive, hard to search.
Instructor-led training $30 to $100[1]	PRO: Interactive; provides social setting, peer motivation. CON: Difficult to schedule.
Videoconferencing $50 to $100[1]	PRO: Interactive; provides social setting, peer motivation. CON: Equipment-dependent.
In-house help desk $75 to $150[1]	PRO: Last resort at corporations. CON: Most expensive form of training.

[1]Per hour.

and no wonder. They're portable, easy to bookmark, and relatively inexpensive at prices ranging from $15 to $90. Even better are CD-ROMs, which deliver the interactivity that books lack, as well as offer engaging multimedia elements like video and animation. Videotapes work well for those seeking a quick introduction to features—if they have reasonable production values. While hardly interactive, some tapes do include indexes to let viewers move quickly to specific sections.

On the horizon is a new breed of Web-based training services. These classes can provide interactive instruction through your browser, combining the advantages of CD-ROM–based training with easy access to a moderated learning environment. See "Training on the Web" for our first impressions of this emerging category.

In corporate environments, instructor-led training—at about $30 to $100 per hour per person—is the best way to ensure everyone is exposed to the material. However, classes are expensive and can be difficult to schedule in a busy office. Desktop videoconferencing can bring instructor-led classes to a larger audience, particularly those at remote sites, but requires about $500 in hardware per seat. Network-based training allows interaction with the training program and can even enable online proficiency testing. But the content often lacks multimedia elements to avoid congesting the network.

Report Card: Training Tools

Thanks to their appealing interactivity, CD-ROMs usually outtrain books and tapes.

	PRODUCTS	Format	Grade	List price
WINDOWS 95	Windows 95 Personal Tutor	CD-ROM	A-	$14.99
	Mastering Windows 95: The Windows 95 Bible	book	B	$34.99
	Windows 95: Video 1	videotape	C-	$59
EXCEL 97	Easy Tutor: Learn Office 97	CD-ROM	A	$29.99
	Special Edition: Using Microsoft Office 97	book	A-	$39.99
	Excel 97: Beginner	videotape	B	$59.95
PHOTOSHOP 4.0	*Classroom in a Book: Adobe Photoshop 4.0*	book	A-	$45
	Software Made Easy: Adobe Photoshop 4.0	CD-ROM	B+	$119.95
	Learning Photoshop 4.0: Introduction	videotape	C	$49.95

SO MANY CHOICES, SO LITTLE TIME

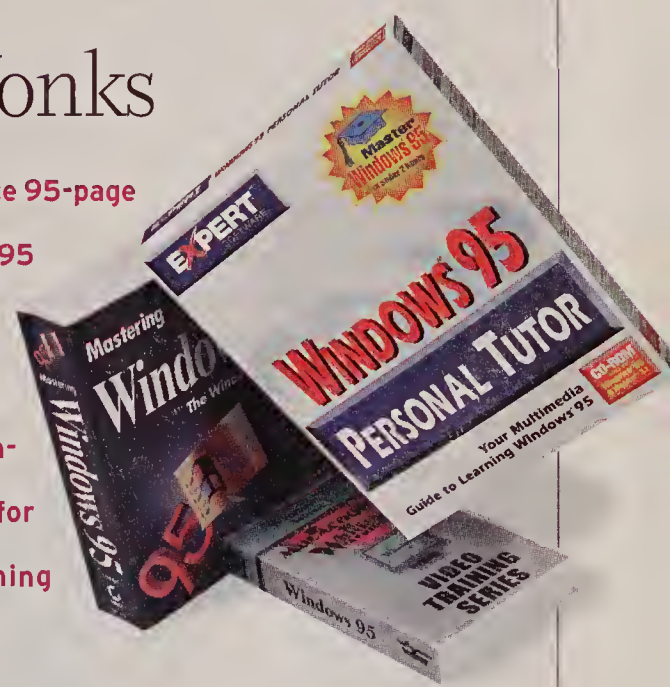
WE LOOKED at the most popular training media—books, videotapes, and CD-ROMs—to see which are the most effective. Products are available for virtually every major software program, so we focused on three prominent applications: Microsoft Windows 95, Microsoft Excel 97, and Adobe Photoshop 4.0. What do we look for in a training product? Everything from the quality of presentation and navigability to thoroughness and interactivity. Of course, price is a concern as well.

Of the media we reviewed, CD-ROMs consistently impressed us with their depth of content, compelling interactivity, and integration into the application being covered. CRT Multimedia's Easy Tutor: Learn Office 97 stood out as the best example of the effectiveness of disc-based training. The books we reviewed also made a strong showing, and are particularly useful as handy references, while videotapes must overcome their lack of interactivity to provide engaging tutorials.

Before you buy, focus on your needs. Do you want a product aimed at beginners or at experts? Do you want a handy reference to back you up, or a 12-hour crash course to get you moving? If you prefer your training neatly presented, a videotape may be best for you, but if you're the hands-on type, check out a CD-ROM title instead.

For **Windows** Wonks

WINDOWS 95 INCLUDES a barely adequate 95-page manual, a brief but informative Windows 95 Online Tour, and a handy electronic edition of the Windows 95 Resource Kit that isn't mentioned anywhere in the documentation. Clearly, there's plenty of room for improvement. We reviewed three training products for those looking to learn.



Expert Software's Windows 95 Personal Tutor ($14.99 list) does by far the best job of covering the basics in a logical and easy-to-understand manner. The instructor, Daniel Will-Harris, describes the structure of the Windows 95 desktop and demonstrates the maintenance tools built into the operating system. This CD-ROM also offers quick shortcuts and tips to make the most of Windows 95. Video replay, search, and glossary buttons help you absorb the lessons at your own pace. You can jump to the Windows 95 interface at any time and practice the lesson—something that many other Win 95 CD-ROM tutorials don't allow. While you won't master Windows 95 in less than 2 hours as the box claims, you can learn the basics with this well-designed and inexpensive tutorial. *Grade: A–;* Expert Software; 800/759-2562; www.expertsoftware.com

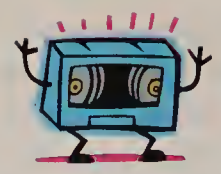
READER SERVICE NO. 673

PHOTOGRAPHS: KEN SMITH

WINDOWS 95 PERSONAL TUTOR'S tutorial begins with the elements of the Windows desktop.

Sybex's Mastering Windows 95: The Windows 95 Bible ($34.99 list), by Robert Cowart, promises "complete coverage of the new desktop for every level of user." That's a tall order, even for a tome that checks in at a hefty 1156 pages. The book's back cover confidently proclaims, "All Levels" and "How-To/Reference." Can a single book really fit everyone? Not in this case. This is an excellent product for people already familiar with Windows 3.1 or Windows 95—there are detailed sections on using fonts effectively, working with multimedia files, and compressing your PC's hard drive. There also are lessons covering Windows 95 networking. But this book is not the best fit for a novice—it provides very little introductory material. *Grade: B;* Sybex; 800/227-2346; www.sybex.com

READER SERVICE NO. 674



Windows 95: Video 1 ($59 list), from Windows Academy, sits at the other extreme: It takes a full 24 minutes before discussing Windows 95 in any detail. This 135-minute training videotape begins with a 7-minute intro from the company president that serves mostly as a commercial. That's followed by a 17-minute tour of each computer component, including a lengthy demonstration of how to clean a mouse and a trackball. While the intention may be to offer a complete introduction to Windows 95, this approach could discourage neophytes by making the program seem unduly complicated. Waiting 24 minutes for an instructor to get to the point isn't the best way to build enthusiasm for a subject. When you do get to

A Closer Look at Training **CD-ROMs**

WHEN IT COMES to making sense of new software, we found that no tool is better than a good CD-ROM training title. These programs can integrate into your applications and provide interactive, real-life examples that really get the point across. We review more training CD-ROMs that can help you master applications ranging from Navigator to Excel.

Learn Excel 97 This title ($14.99 list) uses methodical video-based instruction to help beginners master Excel. You're guided along a study path so you won't miss any lessons. A practice mode allows you to work in tandem with Excel as you learn, but the program doesn't track your progress, which makes it hard to know how well you're doing. *Grade: B;* CompuWorks; 800/229-2714; www.wizworks.com

READER SERVICE NO. 675

Learn Netscape Navigator Quick & Easy, Learn Internet Explorer Quick & Easy These two novice-oriented packages use simulated versions of Netscape Navigator 3.0 and Internet Explorer 3.0, pop-up windows, and audio to hammer their lessons home. Narration guides you through Internet basics, browsing and searching the Web, working with e-mail, exploring newsgroups, and using FTP and Gopher sites. Lessons stop frequently and require you to use browser buttons, menus, and links before proceeding. Each package costs $19.95 list. *Grade: B;* Individual Software Inc.; 800/822-3522; www.individualsoftware.com

READER SERVICE NO. 676

Learn Windows 95 Like Learn Excel 97, this title costs $14.99 list and targets novices, providing digital video instruction on the basics of Windows 95. Handy video navigation buttons and an index let you move quickly to areas of interest, while a practice button displays the video and the tool you're using in split screen, allowing you to work along with the instruction. Unfortunately, the show-and-tell approach lacks detail, and users may be irked by some content and interface oversights. *Grade: B-;* CompuWorks; 800/229-2714; www.wizworks.com

READER SERVICE NO. 677

USING A SIMULATED IE 3.0, Learn Internet Explorer Quick & Easy shows you the basics of browsing.

Official Guide to Netscape Navigator Beginners can follow along as the narrator guides you through tasks in your own version of Navigator. The nine lessons in this CD-ROM ($39.95 list) include instructions on browsing, searching, creating and managing bookmarks, downloading files, and managing e-mail. VCR-style controls let you adjust the audio, but working with the tutor while connected to the real Internet can be quirky. *Grade: C;* Personal Training Systems; 800/832-2499; www.ptst.com

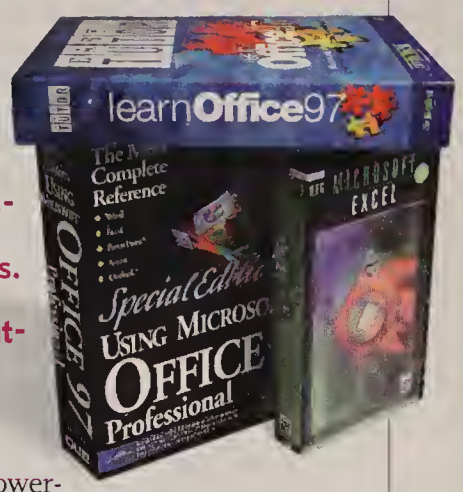
READER SERVICE NO. 678

Windows 95, too much time is spent on nonessentials, including several minutes on how to play Solitaire (under the guise of learning to move the mouse). The time index printed on the box can be useful for finding information on the tape, but you need to keep a sharp eye out, since the time counter appears only when the video is focused on the PC display. *Windows 95: Video 1* is a good example of the problem with videotape instruction. In a book or a CD-ROM, we can simply skip the parts we don't like or that don't apply to us. But with this title, there is no such option. The lesson here: Watch out for videotapes where the instructor tells you more about the subject than you want to know. *Grade: C–;* Windows Academy; 800/527-1914; www.windowsacademy.com

READER SERVICE NO. 679

Deciphering **Excel 97**

MOST TRAINING products include Excel as part of an overall Office tutorial. Office 97's built-in Office Assistant lets you ask questions using ordinary phrases, and the help system provides step-by-step directions. But intermediate or advanced users will benefit from outside resources. Here are some options.



CRT Multimedia's Easy Tutor: Learn Office 97 ($29.99 list) outperformed a terrific group of Excel 97 training products. The company bills its CD-ROM as the "most comprehensive guide to learn Microsoft Word, Excel, and PowerPoint." *Comprehensive* is certainly the word we'd use to describe this title. Despite the fact that the disc covers multiple applications, the Excel portion provides you with detailed introductory-level instruction, as well as a generous ▶

THE SPEED LEARNING SYSTEM guides you through Photoshop's installation process.

On-Demand Interactive Learning for Word 97 The best training title of this group, the program integrates directly into Word 97 and offers three training modes. "Demo" uses a slide presentation to walk you through a topic, while "Teacher" employs a help guide-like window to let you perform a described procedure on a dummy document. "Concurrent" lets you work with real data, using a help window and a red laserlike pointer to show the next step to take to complete a task. The disc targets beginners and intermediates and costs $32 list. *Grade: A;* PTS Learning Systems Inc.; 800/387-8878; www.ptsls.com

READER SERVICE NO. 680

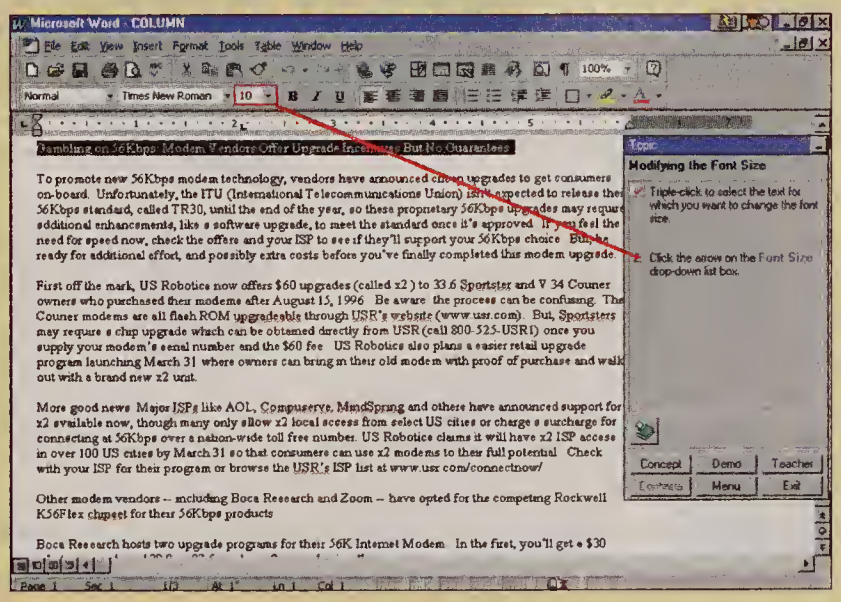
Photoshop 4.0 Volume 1 Speed Learning System, PageMaker 6.5 Volume 1 Speed Learning System These two multivolume CD-ROMs use digital video to present recorded lectures, complete with instructors who occasionally ramble and repeat themselves as they explain the ins and outs of Photoshop or PageMaker. We reviewed volume one of each six-volume product; both products feature handy indexes that allow you to jump to your favorite topic or subtopic. Photoshop training goes from the basics of installation and viewing images to the use of Marquee selections and the Lasso tool, while the PageMaker title covers setup, navigation, and the details of modifying text and importing graphics. Comprehensive and well structured, these titles nonetheless lack the interactivity and the hands-on practice provided in the best CD-ROM training titles. They are also expensive. Each product costs $59 per single volume (list), or $294 when all six discs are purchased together. *Grade: B;* Windows Academy; 800/527-1914; www.windowsacademy.com

READER SERVICE NO. 681

Software Made Easy: Personal Training for Excel for Windows 95 This thorough CD-ROM is one of the few we looked at that does not cater to a novice audience. A tutor talks you through tasks on practice spreadsheets, where you get useful hands-on interaction. However, you'll need your own copy of Excel to work with the files. This disc ($119.95 list) includes lessons for beginning, intermediate, and advanced users and provides sample workbooks, charts, and graphs for each, allowing you to jump to any section that you need. Lessons move up in difficulty as you progress. VCR-style buttons let you control the audio. Beginners may be thrown off by the slightly cumbersome setup process. *Grade: B–;* Personal Training Systems; 800/832-2499; www.ptst.com

READER SERVICE NO. 682

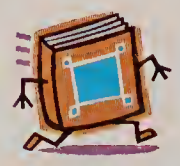
—Dean Andrews



ON-DEMAND'S Concurrent mode shows you how to apply what you've learned to your own documents.

helping of midlevel tips on layout and design. You begin by indicating the depth of knowledge that you're seeking: Quick-Start, Day to Day, or In Depth. Having the material in separate How-To and Concepts sections seems awkward, but the program's dual structure provides a safety net for users who feel that they haven't grasped the basics. Easy Tutor offers feedback via progress indicators and content testing. *Grade: A;* CRT Multimedia; 972/789-5135; www.crtmm.com

READER SERVICE NO. 683



Que's Special Edition: Using Microsoft Office 97 ($39.99 list), by Rick and Patty Winter, is a whopping 1234 pages long, with 196 pages devoted to Excel, and another 262 pages covering features common to all the Microsoft Office applications. The book is accurately labeled as being for casual to expert users (new users are specifically excluded), so it can legitimately omit much of the strictly introductory material. The structure is fiercely task oriented, concentrating on such areas as creating, editing, and formatting worksheets; using formulas and functions; and creating and printing reports. The material is thorough and logically laid out, and the book does an especially good job of showing how the component programs interact with each other. No, you won't find any whiz-bang video or animation here, but you'll hardly miss it. *Special Edition: Using Microsoft Office 97* is an excellent example of how a well-structured book can place an answer literally at your fingertips. *Grade: A–;* Que; 800/428-5331; www.mcp.com/que

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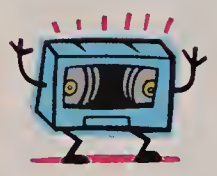

LearnKey's Excel 97: Beginner ($59.95 list separately, or $229 with Microsoft Office 97) benefits from the considerable energy of instructor Reed Jacobson. After all, anyone who calls himself the "world's foremost authority on Microsoft Excel" had better be good. Fortunately, this self-proclaimed Excelaholic provides just the right combination of enthusiasm, corny humor, and insightful instruction in this 115-minute videotape.

Jacobson employs a question-and-answer format throughout his presentation. Since he clearly has spent time instructing others in Excel, it works well here. He is especially adept at explaining alternate ways to perform a task. For example, he provides three ways to make numbers "look like money" and shows you when to use each method. Jacobson never resorts to computer jargon, even though some of the training examples he gives are quite sophisticated. *Excel 97: Beginner* shows one of videotape's best points: its ability to bring a top instructor to a wide audience. It also proves that an enthusiastic, knowledgeable, and carefully orchestrated presentation can make all the difference. *Grade: B;* LearnKey; 800/865-0165; www.learnkey.com

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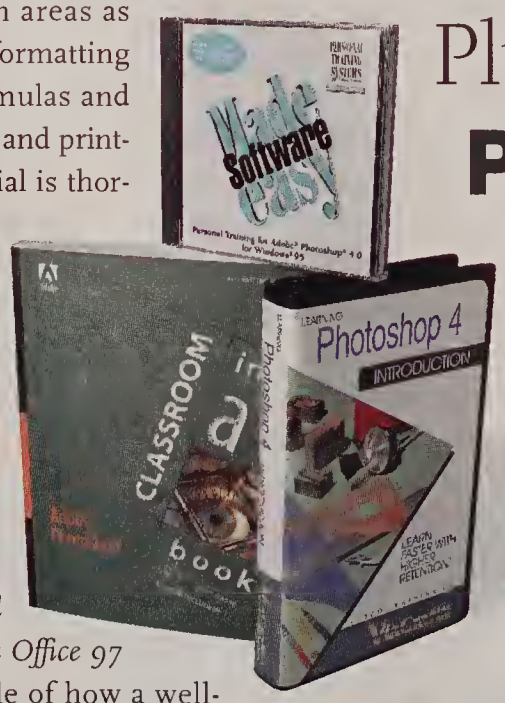
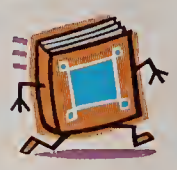
THE EASY TUTOR: LEARN OFFICE 97 CD-ROM provides a Concepts section to reassure confused trainees.

Plugging Into **Adobe Photoshop 4.0**



PHOTOSHOP SHIPS with a separate CD-ROM tutorial that covers the basics, new features, and some advanced techniques. Although useful, the disc isn't as thorough as most commercial training products, and Photoshop is complex enough that most people will want additional instruction. If you're beginning to assume that CD-ROMs are always the way to go, think again: Adobe's own book led the pack here.



Classroom in a Book: Adobe Photoshop 4.0 ($45 list) is Adobe's home-cooked remedy to the complexity of its photo editing package. The results are right on. The book begins with a brief 12-page introduction to the program's tools, palettes, and basic functions. It then moves to 12 task-oriented lessons and 4 midlevel projects (creating a CD cover, using special effects, retouching a photograph, and applying a duotone process). A special 24-page section uses high-quality color photos to illustrate the various techniques—in much more detail than could be achieved with a videotape or a CD-ROM. The book's cover accurately refers to *Classroom* as a "training workbook" and states that readers will need "familiarity with the tools, interface, and documentation of Adobe Photoshop." However, we think that the clean layout and step-by-step illustrations make this book appropriate for everyone but the ▶

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newest of novices. *Grade: A–;* Adobe Press; 800/428-5331; www.adobe.com

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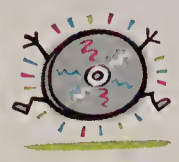

Personal Training Systems' Software Made Easy: Adobe Photoshop 4.0 ($119.95 list) is unusual for a training CD-ROM—it's basically an audio walk-through. However, this product, though innovative and thorough, costs more than twice as much as *Classroom in a Book: Adobe Photoshop 4.0*. The disc includes the work files you'll need to perform the lessons, plus a VCR-like control bar that stays visible on screen as you carry out the instructions within Photoshop. The lessons are detailed, with the audio trainer stepping you through such useful projects as making irregular selections, creating glowing effects, retouching images, and cloning with the rubber stamp. Once immersed in the tutorial, you hardly miss seeing the instructor. And viewing only the program on screen really helps focus your attention on the highly visual projects. While this product uses a novel and rewarding approach, individual users may feel the pinch of its high price. *Grade: B+;* Personal Training Systems; 800/832-2499; www.cbtsys.com

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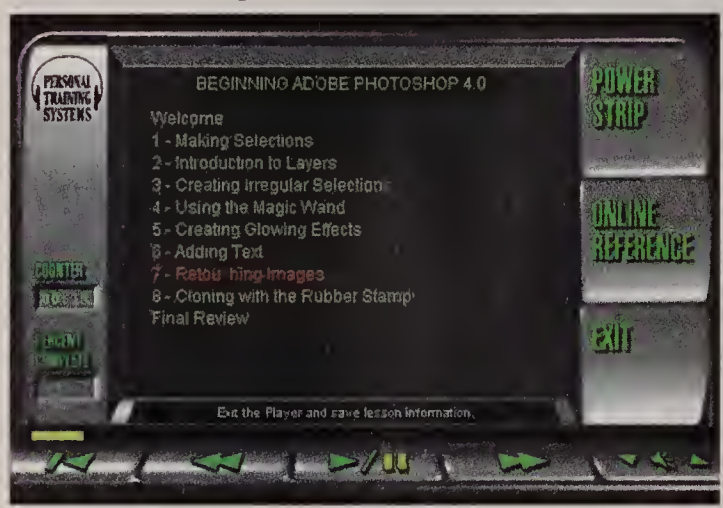
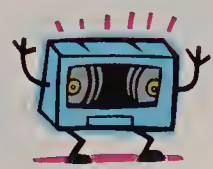


THE USEFUL RECORDERLIKE INTERFACE featured in Software Made Easy: Adobe Photoshop 4.0 allows you to control the pace of audio training.



Learning Photoshop 4.0: Introduction ($49.95 list), from ViaGrafix, proves that presentation is crucial. While CD-ROMs and books succeed in involving the trainee in the process, videotapes can come off as cold and sterile. Despite this product's excellent content, it spends too much time simply listing features and explaining how they function. The features are demonstrated on a simulated computer screen, but the back-and-forth verbal explanation and demonstration becomes monotonous. Videos can be more compelling than books when the instructor has a dynamic personality, but in this case the presentation falls flat. One nice touch rarely found in any kind of training: step-by-step instructions on how to delete the included sample files. *Grade: C;* ViaGrafix; 800/842-4723; www.viagrafix.com

READER SERVICE NO. 688

David English is a freelance writer who has published more than 500 computer-related articles. He is based in Greensboro, North Carolina. Dean Andrews is a frequent contributor to PC World.

For more information about all products in this article, circle reader service no. 905. ■

E-Training in Your Future

By 2001, digital teaching is expected to account for approximately one-third of all money spent on information technology education.

EDUCATION	1996	2001	Annual growth
Instructor-led training	$5.7 billion	$8.1 billion	7.3 percent
Digital teaching	$1.1 billion	$4.1 billion	29.9 percent
Text-based training	$0.3 billion	$0.7 billion	16.9 percent

Source: International Data Corporation

Training on the **Web**

WHAT'S THE LATEST thing in computer training? Why, the Internet, of course. I took one of the first Web-based courses out for a spin.

LearnItOnline (www.learnitonline.com) costs $29.95 annually for access to an unlimited number of courses—a deal that makes this online training service affordable for almost anyone. At press time the course list included Win 95, Windows NT 4.0, Word 7.0, Excel 7.0, Access 7.0, PowerPoint 7.0, Internet Explorer 3.0, Netscape Navigator 3.0, and Excel 97.

GOING TO SCHOOL

I SELECTED Word 7.0 Level 2. Before starting the course, I had to take a few minutes to download and install the Learn Flow plug-in, which works with version 3.0 of both Netscape Navigator and Internet Explorer.

Word 7.0 Level 2 starts with the lesson "Customizing the Screen." I jumped in and was startled when my browser disappeared and a full-screen representation of Word appeared, complete with a brand-new control panel. The control panel let me move through the lesson's 31 pages, turn the audio on and off, and quit the lesson.

MUTE THE TEACHER

UNFORTUNATELY, the audio isn't recommended unless you have a fast connection, such as ISDN, T1, or 56-kilobits-per-second access. Following the text-based instructions—which I found adequate—I used the simulated menus and buttons to carry out each directive. When I pressed a wrong button, a window opened to explain that I had made a mistake, and that I could either try again or have the computer show me how to do it. It took me about 80 minutes to complete the 19 lessons in the course.

LearnItOnline allowed me to progress at my own speed, and the material was comprehensive and clear. No doubt about it, this type of training could catch on quickly. *Grade: A-* —D. E.

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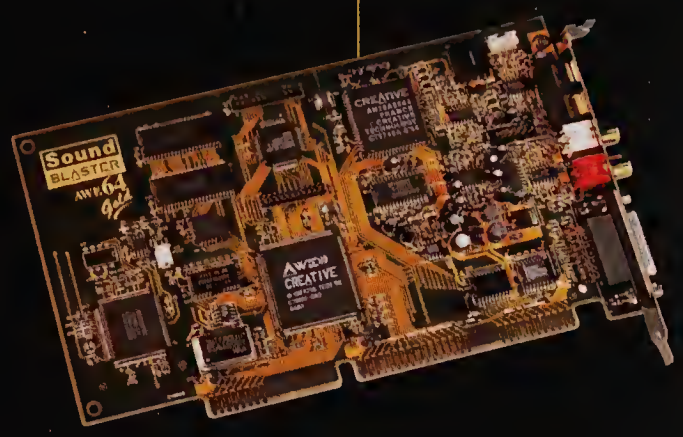

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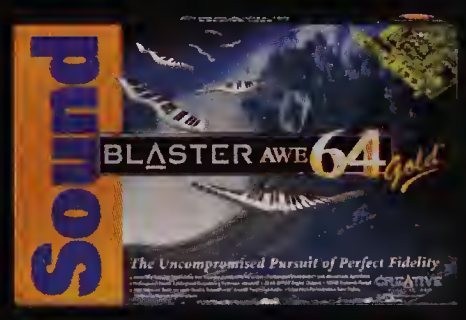

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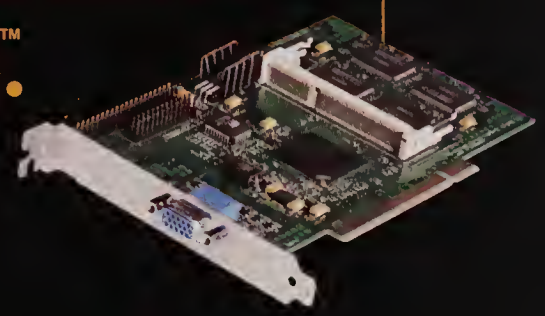

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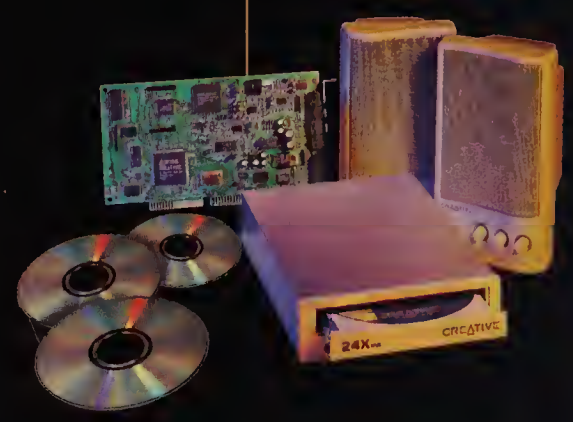

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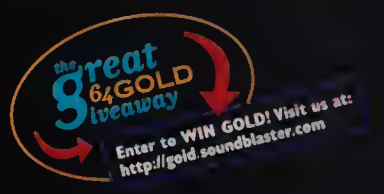

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YOU Are Being Watched

Robert X was fired for downloading porn from the Web. And he's not alone. More businesses are monitoring Internet use and disciplining abusers.

Are you at risk?

BY JAMES A. MARTIN

"I'M AFRAID WE have no choice," Robert's supervisor began. "You're fired."

Robert (not his real name) knew his job was on the line, but the news still came as a blow. For five years he'd worked as a technologist for a state agency. Robert had a solid reputation, a wife of 15 years, and four children. Now he had been fired for surfing the Internet.

Several months earlier, Robert had ▶

PHOTO ILLUSTRATION BY IAN LOGAN

begun visiting sexually explicit Web sites after work hours. It became a habit and then an obsession. Before long, Robert's supervisor summoned him into her office and told him she knew he'd been visiting pornographic sites. She warned him that if it happened again, he could be dismissed. Within a few months, Robert was at it again—even though he was well aware of the risks. "I just couldn't control it," he says today. "With Internet access, suddenly there was this wealth of material that I could get easily—and for free."

For many organizations, access to the Internet's rich resources has come at a high price. Employers pay the cost in lost productivity, as some workers use their "free" Net access to shop, chat, pay bills, play games, or even download sexually explicit material. For employees like Robert, misuse of the Net can cost them their jobs.

Robert's story may be extreme, but it's not unique. According to a *PC World* survey of top executives at 200 companies, one in five firms has disciplined employees for improper Internet use—from taking away their surfing privileges to taking away their livelihood.

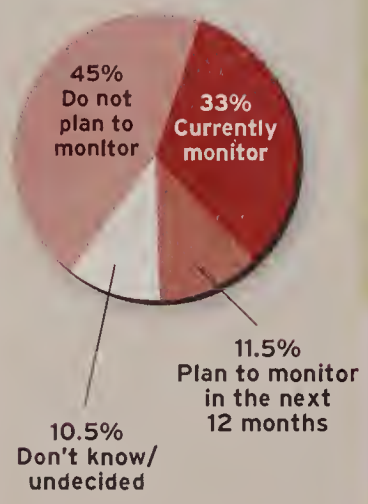
In fact, one-third of the companies we contacted monitor where their employees go on the Net. Another 12 percent plan to begin this kind of monitoring in the next 12 months. In addition, firms with more than 1000 employees are twice as likely to monitor than their small and midsize counterparts.

PC WORLD PHONE SURVEY

Surfing on Company Time? You Could Lose Your Privacy...

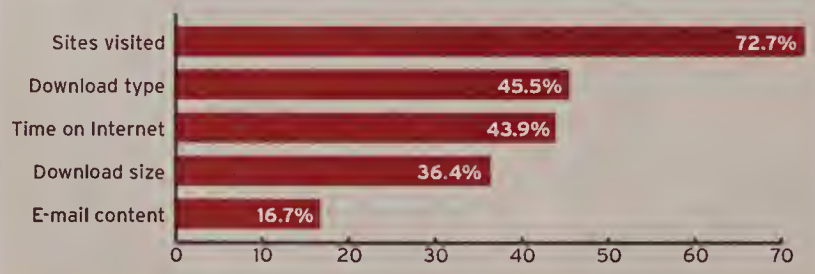
THE BOSS KNOWS WHERE YOU GO

One-third of the companies we surveyed watch where their employees go on the Net.



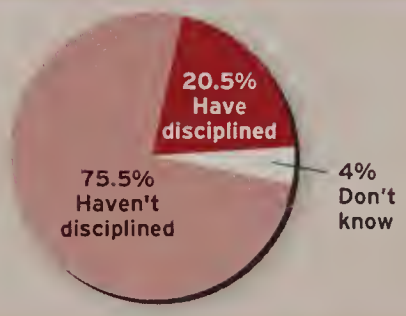
EVERY MOVE YOU MAKE

What's Big Brother looking for when scrutinizing your Internet activities?



PUNISHING NET ABUSE

More than 20 percent of companies we surveyed have disciplined employees for Net misuse.



SPYING ON THE SLY

Employers have a responsibility to tell you if they monitor electronic communications, but one in seven companies doesn't tell.

METHODOLOGY: Last May we hired First Market Research of Austin, Texas, to call corporate and government executives who make decisions regarding their companies' Internet policies. Two hundred of them answered our survey questions. Those surveyed were randomly selected from a list of PC World and InfoWorld subscribers. Source: PC World phone survey, May 1997

> "Our MIS people [do random monitoring] once a month to see if any users are visiting sites that we know have offensive material."
>
> DICK WILSON, VICE PRESIDENT, NATIONAL SEMICONDUCTOR

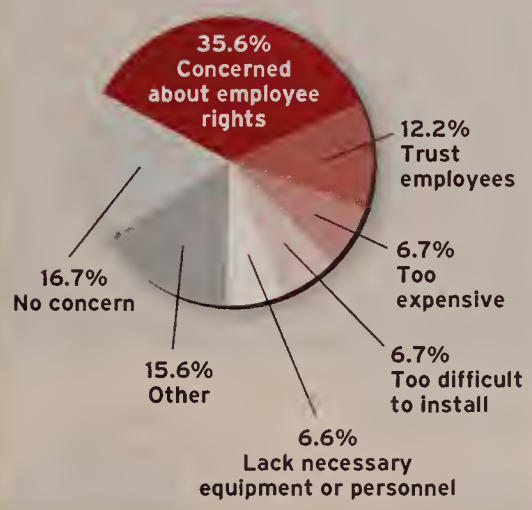
But watchful eyes aren't lurking in every corporate boardroom. More than half of the executives we surveyed are opposed to peering over their employees' cyber-shoulders. Their primary reason for not monitoring? Concern over employees' rights.

When it comes to Internet surveillance, corporate America is clearly divided. But better play it safe: Remember that whatever you do on the Internet—from downloading files to visiting sites to sending e-mail—someone may be watching.

...and Maybe Your Job

PRIVACY MATTERS

Some companies choose not to monitor your Net usage. What stops them? Most are concerned about your rights as an employee.



Numbers do not add up to 100 percent due to rounding.

FROM WIRED TO FIRED

INAPPROPRIATE INTERNET USE on the job is fast becoming a major problem, concurs Richard Power, spokesperson for the Computer Security Institute, an information security consulting and training firm in San Francisco. "People are getting fired for this all the time."

Repeated visits to adult-oriented Web sites are the most common cause for Internet-related job dismissals. But employees have also been fired for shopping, gambling, or chatting online. In our survey, we uncovered nine companies that had fired employees for inappropriate Internet behavior. In addition, we found these notable cases:

- Four employees at the Los Alamos National Laboratory in New Mexico were fired between late 1996 and early 1997 for surfing adult Web sites on the job. Ten others were disciplined during the same period for using the Net for online shopping and other personal reasons. Similar crackdowns occurred at Lawrence Livermore National Laboratory in Livermore, California, and Sandia National Laboratories in Albuquerque, New Mexico.
- An employee of a Southern California aerospace engineering firm who was working as a contractor for NASA was terminated earlier this year for spending too much time in an Internet forum on home repairs.
- Six employees at an Electronic Data Systems site in Troy, Michigan, were fired earlier this year for abusing their Internet privileges. The discharged workers included one highly regarded systems administrator who, despite several warnings, made 15,000 visits to the same adult Web site in just one month.

Companies that monitor Net usage often have big investments to protect. To find out how their workers are using that investment, many firms rely on network surveillance software like Sequel Technology Net Access Manager or NetPartners Internet Solutions' WebSense, which can keep track of the sites people visit and the material they access. (See "I Spy: Tools for Corporate Intelligence" for an overview of Internet monitoring software.)

Ironically, by monitoring Internet use and disciplining abusers, companies contend that they're protecting employees—particularly when it comes to potential sexual harassment in the office that can arise from downloaded pornography.

THE NEED FOR MONITORING

ACCORDING TO OUR SURVEY, nearly 58 percent of employers who monitor their staff's Internet travels do so to crack down on recreational use; 47 percent hope to put an end to downloads of pirated software; and exactly one-third want to avoid sluggish Internet connections due to recreational browsing or excessive downloads. But experts warn that the biggest problems resulting from inappropriate Internet surfing are legal liabilities.

"Most companies haven't fully realized the potential for liability [that the Internet poses]," says Albert Gidari, a partner in the Seattle law firm Perkins Coie who focuses on Internet law. For one thing, the problem of pornography in the workplace can mushroom into an expensive, embarrassing sexual harassment suit, Gidari adds.

Some companies use monitoring software almost exclusively for preventing charges of sexual harassment or fostering a hostile workplace. For instance, the 6000 Internet users at National Semiconductor's worldwide offices are monitored randomly to ensure they aren't visiting adult-oriented Web sites, according to Dick Wilson, vice president of worldwide human resources for the Santa Clara, California, chip maker.

"Our MIS people take a random sampling once a month to see if any users are visiting sites that we know have offen- ▶

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512KB Integrated L2 Cache per processor
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Business Lease: $393/month

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300MHz Pentium II Processor (Expandable to Dual Processors)
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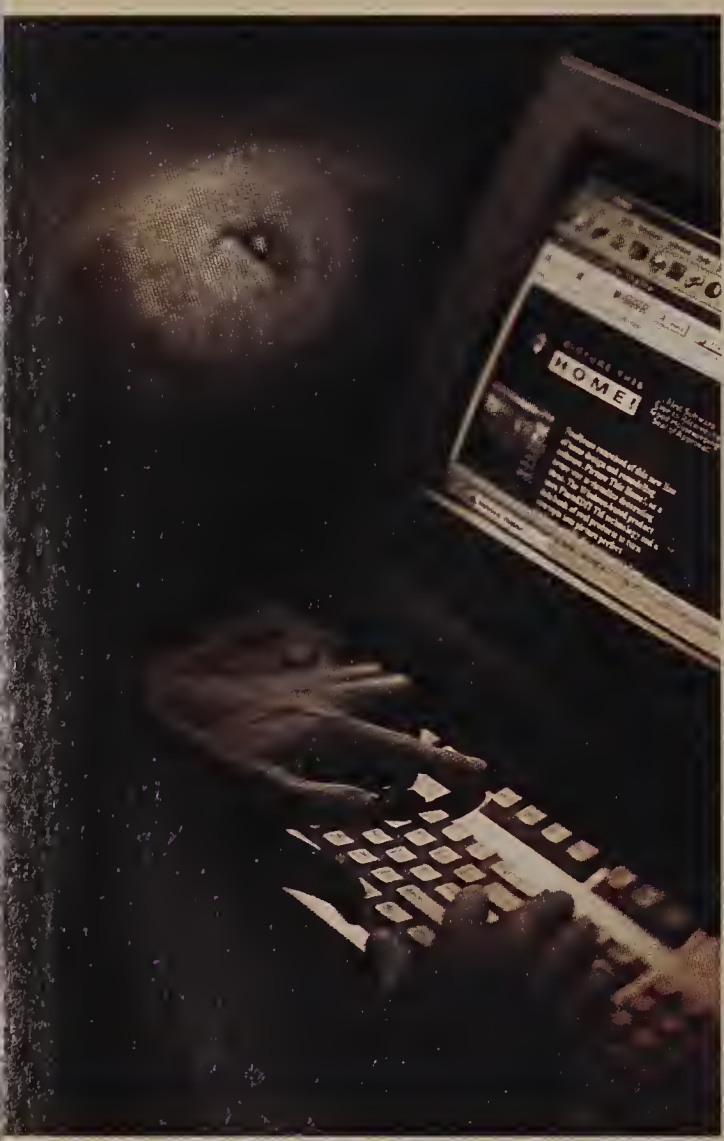
sive material," Wilson explains. "If we find an employee is going to any of these sites, we notify that person's manager."

Simply monitoring Internet usage isn't enough, explains Ed Cavazos, senior vice president and general counsel of Interliant, a data network/Internet service provider in Houston. A company is at risk if it doesn't clearly notify employees that downloading or viewing sexually explicit materials will not be tolerated. And it could be charged with fostering a hostile-workplace environment if supervisors are aware that their employees are visiting adult-oriented Web sites but fail to warn or discipline them, Cavazos adds.

But pornography isn't the only Internet abuse that should flash a warning light to



I Spy: Tools for Corporate Intelligence

THE MARKETING department has gone Web-happy. Your administrative assistant reboots the computer every time you pass by. Ever since everyone in the company got full Internet access, production has slowed to a crawl. You don't need to be a CIA agent to figure out that people are wasting time on the Net. What do you do? It may be time to invest in Internet surveillance software.

GOTCHA! Surveillance programs perform two key functions: monitoring what employees do on the Net, and blocking access to specified sites. Some programs focus on monitoring, which is useful for documenting violations of your company's Internet policy. Others excel at blocking—good if you already know what you want to make off-limits. But the software is expensive—from $995 to $5000—and complicated to set up. Most require Windows NT Server software, and some need to be integrated with proxy servers from Microsoft or Netscape. It's a job best left to network administrators.

WHAT YOU WATCH If your primary aim is monitoring, you'll want software that tracks a variety of Net activities, like Web site visits, file transfers, and source and destination e-mail addresses. And if you've been suffering Internet slowdowns, tracking the amount of data each user downloads can tell you who's hogging all the bandwidth. Once the program logs the information, you'll need it to produce reports that make the data easy to understand. For example, Sequel Technology Net Access Manager not only provides its own reporting tools but also lets you create custom reports using any database reporting tool you choose.

GETTING TO KNOW YOU Check out how the program tracks users. Most identify them by IP address, but some use network log-in. Log-ins are usually best—they let the IS department identify that the visitor to the Playboy site was Joe Miller, rather than machine 1.160.10.240. Some programs can identify groups of users—useful if, say, you

WEB SECURITY FEATURES COMPARISON

PRODUCT	Base price (8/26/97)	Subscription price for 100 users	Platform	Integrates with proxy server	Monitors/ blocks Web sites	Monitors/ blocks file transfers	Monitors/ blocks e-mail addresses	Monitors/ blocks newsgroups
Microsystems Software Cyber Patrol Proxy 800/828-2608 www.microsys.com	$1995 [1]	$995	Windows NT 3.51 or later, Microsoft proxy server 1.0, Netscape proxy server 2.51 or later	●	○/●	○/●	●/○	●/●
NetPartners Internet Solutions WebSense 800/723-1166 www.netpart.com	n/a	$1495	Windows NT 3.51 or later, Solaris 2.3 or later	○ [3]	●/●	●/●	●/●	●/●
On Technology On Guard Internet Manager 617/374-1400 www.onguard.on.com	$2997	n/a	Windows NT 3.51 or later	○	●/●	●/●	●/○	●/○
Secure Computing SmartFilter 800/379-4944 www.securecomputing.com	$5000	$1800	Windows NT 3.51 or later	○ [3]	●/●	●/●	●/●	●/●
Sequel Technology Net Access Manager 800/973-7835 www.sequeltech.com	$3499	$340	Windows NT 3.51 or later, Microsoft SQL Server 6.0 or 6.5	○	●/●	●/●	●/●	●/●
Spyglass SurfWatch for Microsoft Proxy Server 650/948-9500 www.surfwatch.com	$995	$746 [4]	Windows NT 4.0	●	●/●	●/●	●/○	●/○

● Yes ○ No n/a = not applicable [1] Includes subscription price for one year. [2] Provided by hosting proxy server. [3] Available as proxy add-on. [4] For 250 users.

employers. Copyright violation is another potential minefield for businesses that provide their employees with Net access, warns Gidari.

"You might have an overzealous employee posting false information on the Internet about your competitors; that's defamation," Gidari says. Another example: "You might even have some employees running an illegal betting operation over the Internet. In other words," he says, "there are lots of ways an employer can be held liable for something an employee does on the Internet."

> "Most companies haven't fully realized the potential for liability [that the Internet poses]."
>
> ALBERT GIDARI, ATTORNEY AND EXPERT IN INTERNET LAW

According to several sources interviewed for this article, there haven't been any cases in which an employer was held directly responsible for an employee's cyberbehavior—yet. Still, observers say, it's only a matter of time.

BLOCK THAT SITE

SOME ORGANIZATIONS choose to put the brakes on Internet joyriding by blocking their employees' access to entire categories of sites. Filtering software, such as Microsystems Software's CyberPatrol Proxy or NetPartners Internet Solutions' WebSense, can prevent employees from accessing undesirable Web and FTP sites, Internet chat rooms, and newsgroups. It can also relieve companies of the unproven and time-consuming chore of monitoring.

"Blocking has been very effective for us," says Jeff Conley, supervisor of technical services for Johnson Controls, a Cape Canaveral, Florida, company that manages launch-based facilities for the U.S. Air Force, among other projects. "Our biggest issue was that employees would waste time on the Net. By blocking access to sites that fall into pornographic, political, entertainment, automotive, and other categories, we're ensuring that the Internet is used only for work-related reasons."

Nonetheless, according to our survey, blocking Internet sites is far less common than monitoring. Less than one-fifth of the companies we surveyed block employee access to specified Web sites. Not surprisingly, the sites that most employers block contain adult material.

IS MONITORING LEGAL?

IN MOST CASES COMPANIES are well within their rights when they monitor or block their employees' Net access. "There are no laws on the books that can be interpreted as prohibiting an employer from watching what its employees do on the Internet," says Cavazos.

Federal law does offer employees a minimal degree of protection, though. The Electronic Communications Privacy Act generally prevents employers from monitoring personal communications, such as private phone calls, unless there is reason to believe a crime has occurred, or certain other exceptions. However, the ECPA does support an employer's right to monitor stored electronic communications, such as voice-mail and e-mail messages, in order to protect its ▶

want to prevent just the accounting department from surfing the Internet.

LIST OF EVILS If you want to restrict employee access to the Net, look for a program that comes with a database of questionable sites organized by category—adult, politics, entertainment, and so on. You'll want to be able to customize the database with your own forbidden sites, and block sites by both URL and IP address. (Obviously, it's easy to ban access to a Web site if you know its URL, but some sites are known only by IP address.) And because the Net changes by the minute, you'll want to be able to update the database frequently—at least once a week.

FINAL WORDS To prevent a flood of calls to your company's tech support staff, make sure that a suitable message is sent to your employees when their access is blocked. Perhaps you could flash across their screens: 'Sorry—session terminated with extreme prejudice. Signed, Corporate Intelligence Agency.' —Mark Gibbs

			BLOCKING LIST			METHOD		IDENTIFICATION				
Monitors/ blocks Telnet	Monitors/ blocks chat	Monitors/ blocks amount of data	List	Number of sites	Frequency of update	Blocks full URL	Blocks IP address	Identifies users by IP address	Identifies users by log-in name	Identifies users by group	Logging	Reporting
○/●	○/●	●/○	●	20,000	weekly	●	●	2	2	2	○	○
●/●	●/●	●/○	●	75,000	daily	●	●	●	○	○	●	●
●/●	●/○	○/○	○	n/a	n/a	●	●	●	●	●	●	●
●/○	●/●	○/○	●	70,000	weekly	●	●	●	○	○	●	○
●/●	●/●	●/●	○	n/a	n/a	●	●	●	●	●	●	●
●/○	●/○	●/○	●	40,000	daily	●	●	2	2	2	●	○

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Playing it Safe: Staying Out of Trouble on the Net

EMPLOYER

- Create a usage policy that prohibits viewing adult or other controversial sites; copyright infringement; and all unlawful and offensive communications (including e-mail).
- Distribute written or electronic copies of the policy to all employees and update it regularly.
- Inform your employees if you plan to monitor their Net usage. Don't claim to be monitoring unless you really plan to do it.
- Consider letting employees surf the Web on their own time, if they stay within guidelines.

EMPLOYEE

- Ask whether your company has a written Internet policy.
- If your employer doesn't have a policy, play it safe: Do your recreational surfing from home.
- Never download or view material at work that others could deem offensive.
- Never discuss confidential or personal matters via your company's e-mail system.

business, rights, or property. But employers do have some restrictions in monitoring personal communications. The primary requirement: Employees must give their consent.

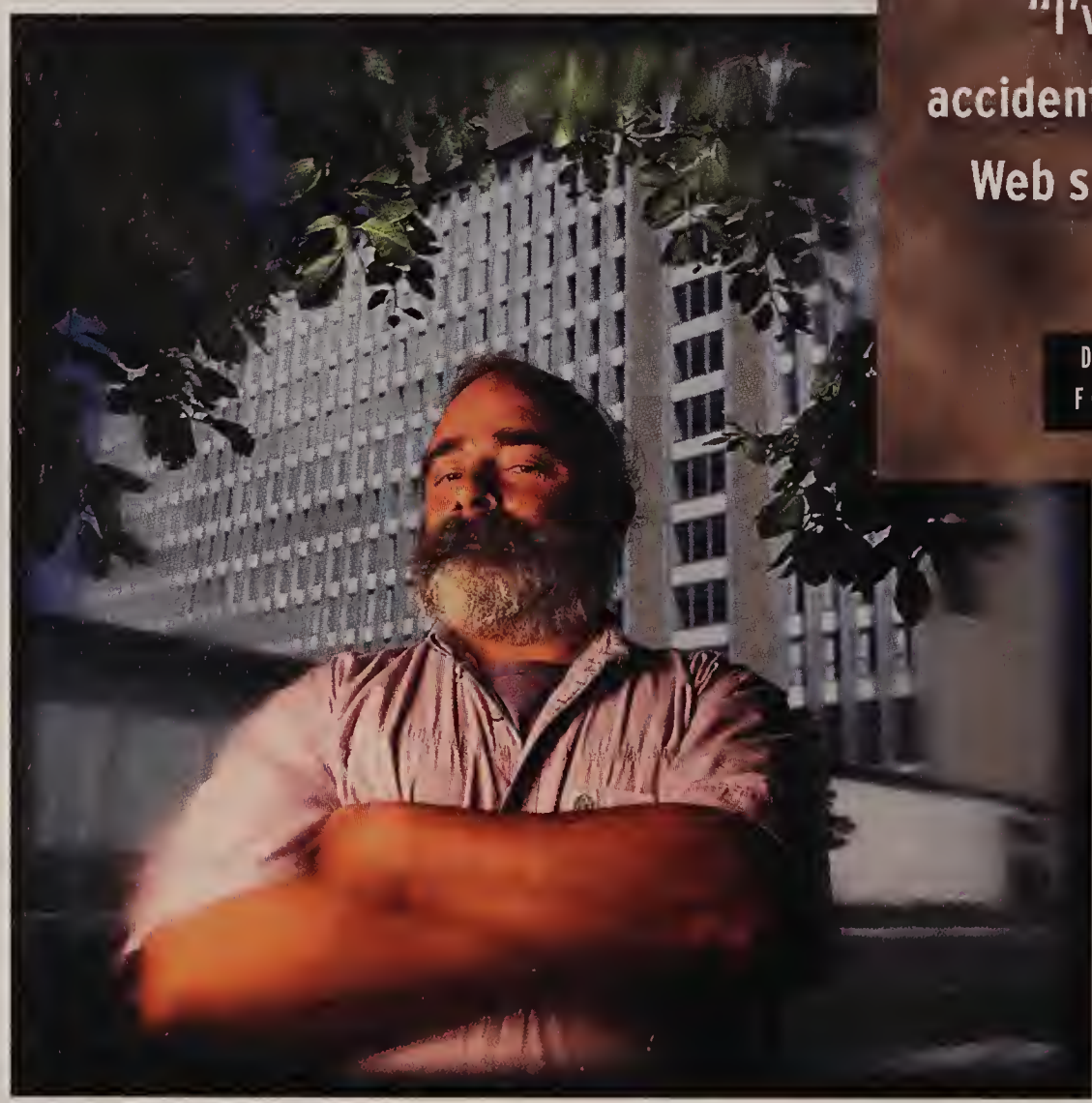
Consent can come in many forms, but not all of them are obvious. For example, your company's general employment policy might give the boss the right to monitor your private communications. When you agree to take the job, you consent to being monitored. To protect itself from potential legal challenges, though, a company should still get explicit employee consent in writing, Cavazos says.

From an employee perspective, the privacy horizon looks pretty bleak. Only Connecticut has placed limitations—albeit minimal ones—on electronic surveillance. Meanwhile, there is no pending legislation that would protect employees from electronic observation, according to Lewis Maltby, director of the American Civil Liberties Union's Workplace Rights Office in Princeton, New Jersey. What's more, according to our phone survey, nearly 14 percent of companies that monitor haven't told employees about the practice. And large companies were much less likely to tell their employees that they were being watched.

THE BIG BROTHER SYNDROME

WHEN A COMPANY MONITORS its employees' use of the Internet, the result can be a fearful work environment. "I've worried from time to time that I might accidentally go to an inappropriate Web site, and it would show up on my records," says Donald B. Ward, a technician at a federal government facility in Gaithersburg, Maryland.

"There are a lot of clever Web site operators out there who can make their site show up in an Internet search, even



> "I've worried that I might accidentally go to an inappropriate Web site, and it would show up on my records."
>
> DONALD B. WARD, TECHNICIAN FOR THE FEDERAL GOVERNMENT

though the site might have nothing to do with what you're researching. If you go to one of those sites and it turns out to be adult oriented, you're in complete violation of the Internet policy for our agency and could even be fired. Luckily," Ward adds, "people are reasonable here. But still, it makes you cautious."

When you give employees the freedom to surf the Internet without the specter of surveillance, they may be more productive in the long run, argues Mike Godwin, staff counsel for the Electronic Frontier Foundation. This San Francisco–based civil liberties group advocates privacy ▶

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in the workplace. "Some employers have a puritanical streak that makes them feel monitoring is justified," Godwin says. "But most people don't want to work for employers like that."

"Unproductive surfing fades as people become more Internet savvy," adds Mary J. Cronin, the author of *Doing Business on the Internet* (Van Nostrand Reinhold, 1994, 800/842-3636). "With every new technology, there's a learning curve, and an important part of that curve is exploration. With the Internet," says Cronin, "users often surf around to get a sense of what the whole Internet universe is all about. But eventually, most people settle down and get back to work."

Monitoring may prevent Internet abuses, but companies should still be cautious. Say a company tries to prevent Net misuse by telling its employees that it's monitoring their Internet activities but then fails to do so. In that instance, the company runs a greater risk of exposing itself to liability claims than if it never said it would monitor at all, says attorney Cavazos.

"If you say you monitor but don't, and an employee does something illicit on the Internet or in their e-mail, you might have trouble proving that you didn't know about it," Cavazos explains.

> "If there were to be any problems with an employee, those problems would present themselves without the need for me to get involved in cloak-and-dagger shenanigans."
>
> SCOTT PADDOCK, MANAGER OF PC BROKERS

Aside from the added responsibility, monitoring employees on the Internet requires time, personnel, and other resources. In our telephone survey, slightly more than half the executives we interviewed are personally opposed to monitoring Internet usage, compared to just over one-third who say they are in favor. The primary reason for opposing Net monitoring is concern about employee privacy. Some also argue that the demands of monitoring far exceed the benefits.

"I don't monitor Internet usage for two reasons," says Scott Paddock, manager of PC Brokers, a computer value-added reseller in Denver. "First, I trust my employees; that's why they work for me. If there were to be any problems with an employee, those problems would present themselves without the need for me to get involved in cloak-and-dagger shenanigans. And second, if I spent time monitoring their Web usage, I would be just as guilty of wasting time as my behavior implies they are," says Paddock.

MAKING INTERNET POLICIES

WHETHER A COMPANY DECIDES to monitor or block its employees' Internet access, experts agree that it should always have an Internet usage policy in place. Such a policy offers guidelines for appropriate behavior when personnel are using the employer's computers and communications resources.

"The best way to defend yourself against potential liability is often a clearly written, well-distributed Internet policy that describes the do's and don'ts," says attorney Cavazos. He recommends that employers make the finished policy part of every new employee's orientation, put it into an employee handbook, and post it on the company intranet. Do whatever you have to do to make sure everyone knows the policy, he adds.

It's not enough to put a policy in place; it must also be reevaluated periodically. "I review all the HR guidelines, including our Internet policy, on a quarterly basis," says Coeta Chambers, an attorney for the human resources department of Intel Corporation in Santa Clara, California. "With technology changing as fast as it does, it's important to make sure our ▶

PC WORLD ONLINE SURVEY

Employees Say It's Okay to Monitor—As Long as They're Informed

IN A PC WORLD ONLINE SURVEY, most respondents said their employer has the right to monitor how they use the Internet connection at work—provided they know if the boss is peering over their virtual shoulder.

THE PC WORLD ONLINE survey was sent to the 10,000 members of the PC World Online Advisory Council, which consists of readers who have volunteered to receive occasional surveys or questionnaires via e-mail. The survey was also promoted through the PC WorldWatch newsletter, a free electronic publication e-mailed to about 150,000 subscribers each week; subscribers were given the address of a Web site they could visit if they wanted to respond. Overall, more than 2500 people responded to the survey.

Source: PC World Online survey, June 1997

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Your Internet Rights on the Job

WHETHER YOU'RE AN EMPLOYER or an employee, you should know what your rights are when it comes to Internet use in the workplace. Mark Grossman, a Florida attorney who specializes in computer and Internet law, gives answers to some basic questions.

SCENARIO 1

Nobody told you that your Internet use in the office was being monitored. Now you've been warned you'll be fired if you use the Internet for recreational surfing again. What are your rights?

BOTTOM LINE When you're using your office computer, you have virtually no rights. You'd have a tough time convincing a court that the boss invaded your privacy by monitoring your use of the company PC on company time. You should probably be grateful you got a warning.

SCENARIO 2

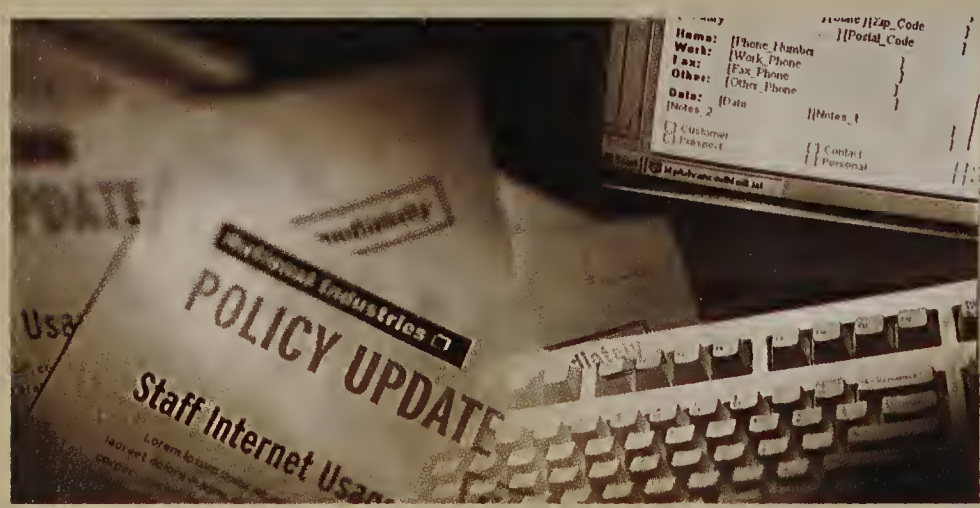
Your employees are abusing their Internet privileges, but you don't have an Internet usage policy. What do you do?

BOTTOM LINE Although the law isn't fully developed in this area, courts are taking a straightforward approach: If it's a company computer, the company can control the way it's used. You don't need an Internet usage policy to prevent inappropriate use of your company computers. To protect yourself in the future, distribute an Internet policy to your employees as soon as possible.

SCENARIO 3

Employee John Doe downloads adult material to his PC at work, and employee Jane Smith sees it. Smith then proceeds to sue the company for sexual harassment. As the employer, are you liable?

BOTTOM LINE Whether it comes from the Internet or from a magazine, adult material simply has no place in the office. So Smith could certainly sue the company for making her work in a sexually hostile environment. The best defense is for the company to have an Internet usage policy that prohibits visits to adult sites. (Of course, you have to follow through. If someone is looking at adult material in the office, you must at least send the offending employee a written reprimand.) If the company lacks a strict Internet policy, though, Smith could prevail in court.



guidelines keep up with those changes."

Some argue that the best way to keep employees out of trouble is to give them guidelines, treat them with respect, and use monitoring data only if necessary.

"We don't specifically monitor individuals, though we do have network monitoring tools," says Paul Swortz, a spokesperson for The Boeing Company, the aircraft manufacturer in Seattle. Boeing uses the data only if there's a need to investigate a complaint. "We trust employees to use common sense when working with company resources, and the Internet isn't any different from any other company resource," explains Swortz.

GOOD NET BEHAVIOR BEGINS AT HOME

BOEING'S RATIONAL APPROACH to curbing Internet excess on the job takes everything into consideration—except for the irrational. The Internet is an unruly, ungoverned, amorphous technology that transmits everything from the useful and informative to the illicit and illegal directly onto computer screens throughout corporate America. That said, there are simply no easy answers for how to foresee, prevent, or handle a situation in which a trusted, valuable, long-term employee loses control in cyberspace.

"I was ashamed of what I'd done, but I also feel I was treated harshly," says Robert, the technologist who was fired as a result of his Internet misdeeds. "My supervisors wanted to make an example of me." Following his dismissal, Robert was unemployed for three months.

And then, out of nowhere—a job offer. He's been at the job for several months now, and claims that his urge to surf for adult materials on the Internet is fully under control.

Ultimately, Robert's experience offers lessons for employees and bosses alike. For workers, Robert's firing is a reminder that the PC on your desk, just like the telephone beside it, is a business tool paid for by the company.

"You wouldn't make a lot of long-distance personal calls at work and not expect anyone to notice or care, so why should using the Internet be any different?" says Ward, the federal employee who fears he may accidentally visit an inappropriate Web site. If you have personal reasons for being on the Net, Ward adds, do it somewhere else—at home, at an Internet café, or at the public library.

For employers, Robert's story underscores the need for a firm Internet usage policy, according to Computer Security Institute's Power. "The most economical, effective solution to this whole problem is actually rather simple," he says. "Make sure your users understand that you can see where they've been on the Internet, and that their actions online can have consequences—including dismissal. Then, make sure they're reminded of this on a regular basis." You won't entirely prevent Internet abuse, Power says, but it's a good start.

James A. Martin is a contributing editor for PC World. *Mark Gibbs is a contributing editor for* Network World. *Mark Grossman is an attorney in Miami, Florida, who focuses on computer and Internet law.* ■

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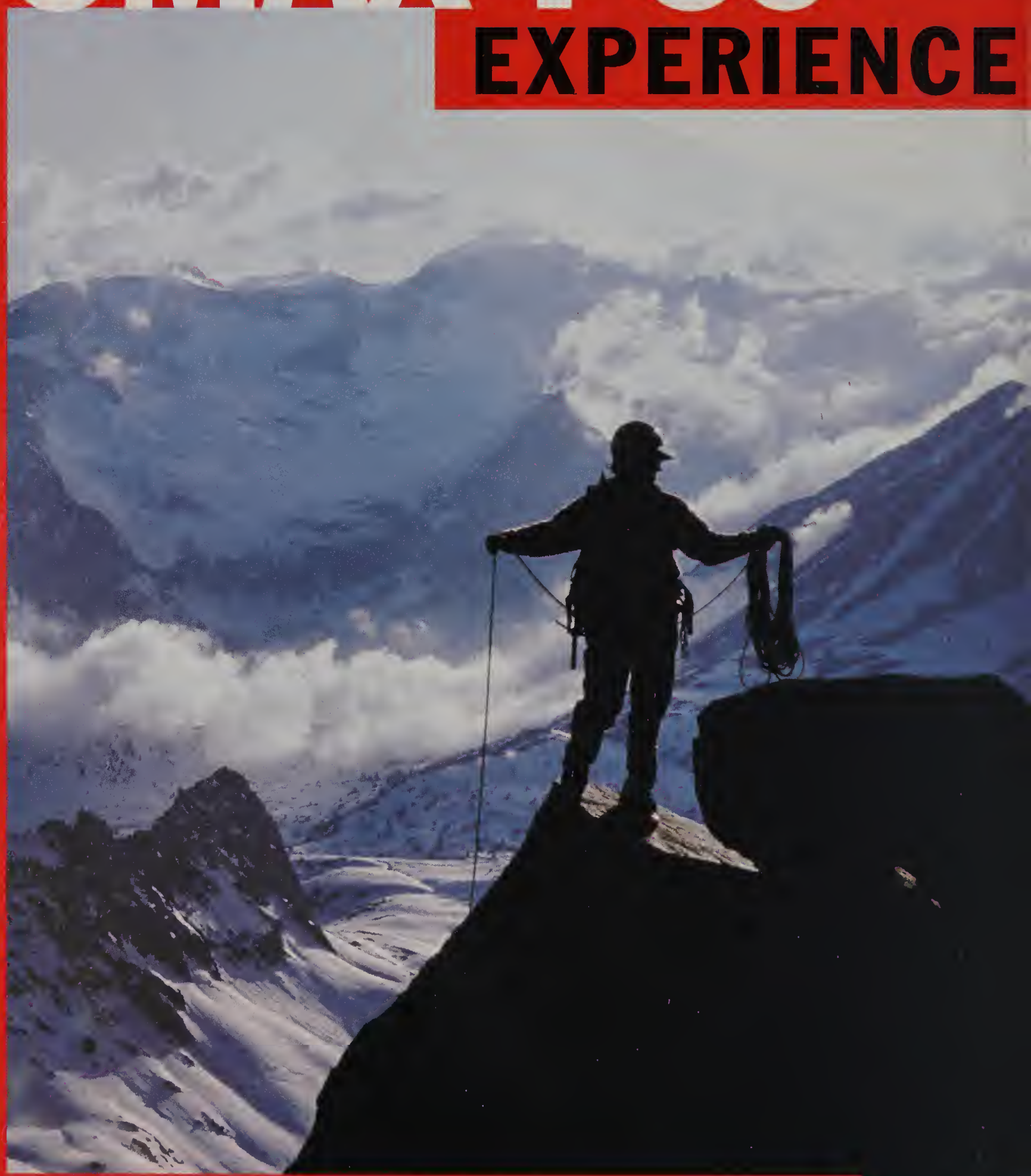

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- 24X High-Speed CD-ROM Drive
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- 1.44MB Floppy Disk Drive
- Yamaha Stereo Speakers with Sub-Woofer
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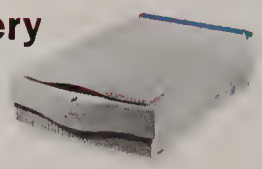

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- 10/100MB PCI Ethernet Card
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- Sound Blaster Compatible Sound
- 1.44MB Floppy Disk Drive
- Amplified Stereo Speakers
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- 15" Flat Screen Color Monitor
- 56K Internal Data/Fax Modem
- 10/100MB PCI Ethernet Card
- Iomega 100MB Zip Drive
- Sound Blaster Compatible Sound
- 1.44MB Floppy Disk Drive
- Amplified Stereo Speakers
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- Mini-Tower Case with 250W

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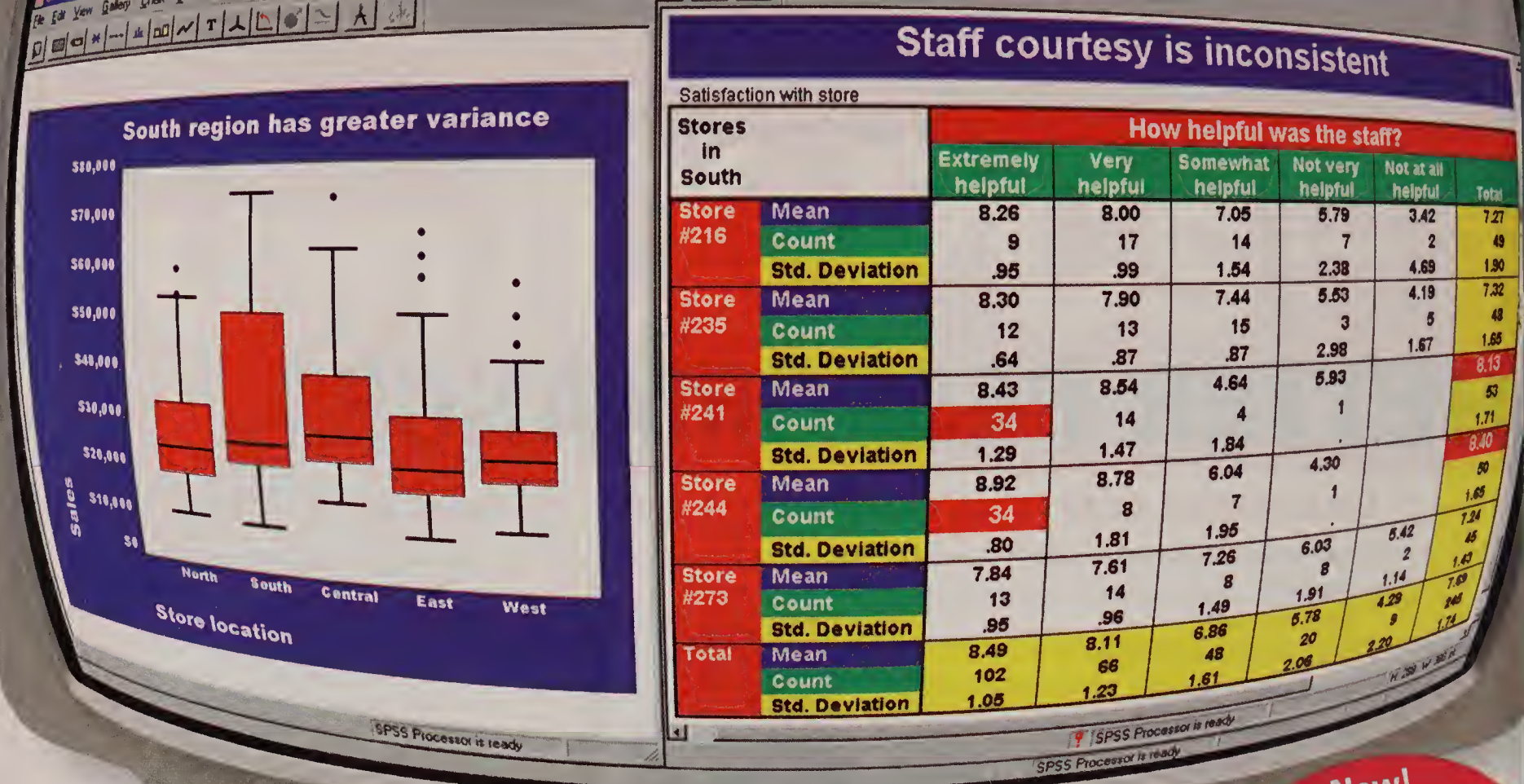

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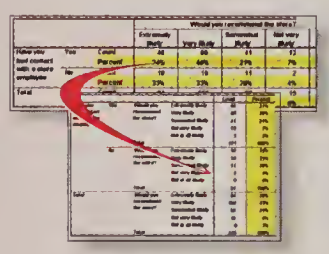

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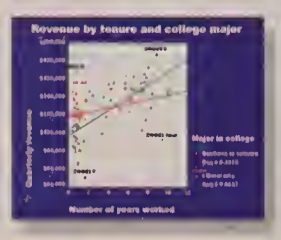

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A monthly update of the best desktop PCs, notebooks, printers, monitors, graphics boards, and modems

PC WORLD

TOP 100

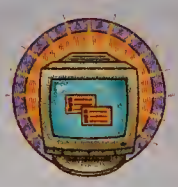
268 Power Desktops

284 Budget Desktops

298 Notebooks

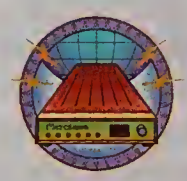
315 Printers

319 Monitors



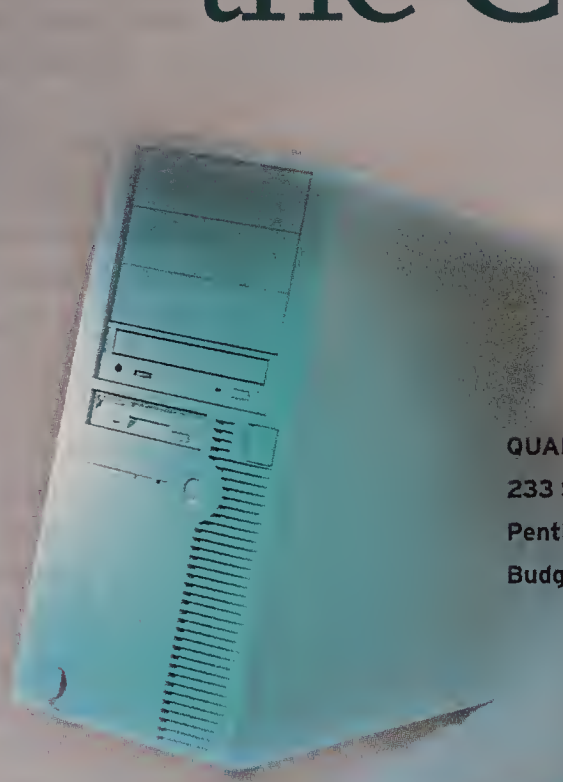
323 Graphics Boards

327 Modems



Best Buy PCs: The Quick *and* the Cheap

EDITED BY REX FARRANCE AND BRYAN HASTINGS



QUANTEX QP6/233 SM-3: First Pentium II on the Budget chart.

DELL DIMENSION XPS D266: New power number one has AGP video.

PHOTOGRAPHS: MARC SIMON ICONS: JEFFREY PELO

IF YOU BOUGHT a new PC two years ago, chances are you shelled out for the deluxe machine of the time: a P-133 with a 1.2GB hard disk, a 4X CD-ROM drive, and 2MB of video RAM. But that was several technological lifetimes ago. Now, after months of feeling like a high-tech Rip van Winkle, you're eager once again to have the latest and fastest PC available.

The new Pentium II-300 fits that description to a T. Based on Intel's latest CPU chip, the 300 would be the fastest, most decked-out PC you can buy right now. But in this month's Top 100, as in last month's "Pentium II-300: The Latest May Not Be the Greatest," we find that it's not the best deal for the money—you can do better with a Pentium II-266. Take our new number one power desktop PC: Dell's new Dimension XPS D266 costs $3099—$200 less than the XPS D300—and the D266 is within 2 percent of the Pentium II-300's speed.

Like all the new Pentium II-300s we reviewed, the new Dell has what you'd expect in a top-end machine, including Intel's 440LX chip set with its support for Accelerated Graphics Port video. AGP dedicates a faster-than-PCI bus to graphics transfers. However, until new apps are created to take advantage of this fast track, you won't see a significant speedup.

GATEWAY 2000 SOLO 9100: Uncompromising 233-MHz speed.

SONY PCG-707C: Sony's first portable—and loaded with luxury.

300 MHZ AND MORE

ACTUALLY, you don't have to buy a power desktop anymore to get Pentium II performance: The $2499 Quantex QP6/233 SM-3 is the first Pentium II to make our Budget chart. In the market for a luxury portable? Check out Gateway 2000's Solo 9100, the first 233-MHz notebook, or Sony's first portable, the new PCG-707C.

We didn't overlook the new Pentium II-300s: Two make our chart—Gateway 2000's G6 300XL and Micron's Millennia XKU 300. The Gateway is the fastest machine we've tested, and it captures a number five Best Buy despite its high $3799 price. The $4187 Micron at number 12 is even more expensive and not quite as fast. These PCs come with the 440LX chip set and AGP. The Millennia is also available in a 266-MHz version.

Dell's new Dimension XPS D series supplants the discontinued XPS H models. They're similar to the machines they replace, but they add the LX chip set and AGP. We tested the Pentium II-300–based Dimension XPS D300, but its higher price and relatively slight performance advantage make it less attractive than the D266. You can also purchase the D series in a Pentium II-233 version that costs $200 less than the D266. In addition, Dell has improved its low-cost LS line of monitors. These products now use Philips electronics, and they display a noticeably sharper image than their predecessors. With all Dell systems, you get the assurance of the company's consistent best rankings in reliability and service.

We also looked at a couple of new corporate powerhouses from Dell and IBM that sport integrated ethernet LAN adapters. Dell's $2865 OptiPlex GXa 266 comes with integrated AGP video. Thanks to its fine Pentium II-266 performance and a terrific design that includes an easily removable expansion slot module, it hits the chart as a number three Best Buy. The $3785 IBM PC 300 XL features special management tools for LAN administrators. You can buy the PC 300 XL with a 233- or 266-MHz Pentium II; we reviewed the latter.

BEST BUYS ON A BUDGET

SOME OF the systems on this month's Budget Desktops Top 20 seem more like power systems—including the Quantex QP6/233 SM-3 at number 13, a Pentium II-233 that costs less than $2500. The DirectWave MVP VC2Desk233 is also a prime example: With its 233-MHz Cyrix CPU, it's faster than the Quantex, yet costs a mere $2000. The Budget chart reflects a strong contra-Intel movement; nearly half the systems use processors from AMD and Cyrix.

Dell's name is prominent on our Budget chart. The $2199 Dell Dimension XPS M200s, a PMMX-200 PC, enters the chart in second place, providing more speed and features than the less-expensive Dimension M200a at number one. Only its price—$400 higher than the M200a's—keeps it out of the top spot. And Dell's new budget corporate model, the$2169 OptiPlex Gn+233, is also a Best Buy at number five. It comes with an integrated ethernet adapter.

TILLAMOOK ARRIVES

THERE'S NOTHING cheesy about the new Pentium MMX-233 processor for notebooks—notwithstanding Intel's "Tillamook" code name. This month we review the Gateway 2000 Solo 9100, the first Pentium MMX-233 notebook we've had our hands on. This $4899 luxury portable has it all, including record-setting performance that beats that of the average Pentium MMX-166 by almost 20 percent. With its gorgeous 13.3-inch screen, good 4.7-hour battery life, and fast 56-kilobits-per-second x2 modem, the Solo 9100 earns a number two Best Buy on our power chart.

The quick Pentium MMX-166–based WinBook FX remains our number one power portable, on the strength of its attractive price. We also review the first Sony notebook computer, the PCG-707C. This handsome Pentium MMX-166 portable combines good design, sturdy construction, and outstanding performance to earn the number seven spot on our power chart, despite its high $4500 price.

We also review new budget notebooks from Gateway 2000 and Toshiba. The $2699 Gateway Solo 2300 wrings impressive MMX-level performance from a standard mobile Pentium-133 and has an amazing 7.5-hour battery life—the longest on our Notebook PCs Top 20. It debuts as our number two Best Buy. The Toshiba Satellite 225CDS is also a Pentium-133, and although it can't match the Gateway 2000 Solo 2300's performance and features, it parlays a low $1999 price into a number eight ranking. The CTX EzBook 750MS continues as the number one budget portable, thanks to outstanding performance and a low $1749 price.

Next month we change our Top 100, maintaining current coverage of desktop PCs, printers, monitors, graphics boards, and modems and adding a Top 10 Home PCs.

CHANGES IN OUR TOP 100

NEXT MONTH WE'LL BE changing the look of our Top 100, maintaining current coverage of desktops, printers, monitors, graphics boards, and modems. Reflecting our readers' increased interest in home systems, we'll incorporate the Top 5 Home PCs into the Top 100, expanding it to a Top 10. To make room, we'll scale back our portables section to a Notebook PCs Top 10—divided into power and budget categories.

Rex Farrance and Bryan Hastings are senior associate editors for PC World. *Assistant Editor Grace Aquino, Editorial Researcher Julie Campagna, Editorial Assistant Mick Lockey, Associate Editor JoAnne Robb, and freelance writers Michael Goodwin, Jon Jacobi, and Dan Littman contributed to the Top 100. Testing for the Top 100 by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeff Kuta, Mike Salayko, and Susan Silvius. See page 14 for contact information.*

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following section should answer most of them. If not, ask us; see page 14 for contact information.

How do the charts work? The Top 20 and Top 10 charts are evolving lists of the best PCs, monitors, modems, printers, and graphics boards we've tested. The Top 20 charts are divided by price. Power desktops cost $2500 or more; power notebooks cost $2750 or more. Every month we test the latest products in each category and compare them to the pool of items we've already reviewed. As new products earn places on the charts, those at the bottom drop off. Price cuts also cause chart changes.

Where do you get your prices? We estimate street prices based on vendor information and our own research, including surveys of retail outlets. We recheck all prices every month.

What does the overall rating mean? It's the sum of all our tests—both hands-on evaluations and automated speed tests. The scale is 1 to 100, so a product that scores in the 90s is generally considered exceptional, one in the 80s is among the best, one in the 70s is above average, and one that scores lower usually doesn't place.

What does the PC WorldBench score mean? It's a measure of how fast a PC is in relation to our baseline machine, a Dell P75t configured with 8MB of RAM, a 540MB hard drive, and no secondary cache. A PC that scores 200, for instance, is twice as fast as the baseline unit.

Where do the scores for reliability, support quality, and support policies come from? Reliability and support quality scores come from readers responding to the Reliability and Service fax-back survey in *PC World*. Fill out the survey at the end of the Top 100 to document your reliability and service experience. The policies score is based on vendor support policies (such as length of warranty and support hours).

What do all those word scores mean? Word scores for performance and price are based on a product's rating in relation to other products in its category. For example, a budget PC that is rated "expensive" is high priced only in relation to other budget PCs. Likewise, a power notebook rated "good" for performance is good only in relation to other power notebooks. Word scores for other categories, such as features, are relative to all desktops or all notebooks.

Where can I find the online version of the Top 100? Go to PC World Online (www.pcworld.com). There you'll find not only the current issue of *PC World* and reviews for the last 10 months, but some extra features, including reviews you won't find in print. If a product misses a chart and we don't cover it here, you can go directly to an online review by using the URL provided in each Top 100 section.

Have you ever wished you could build your own chart based on your buying criteria? You can, with Buyer's Guide, our Web site's unique chart customizer. Buyer's Guide combines your criteria with *PC World*'s current data and test results to generate customized Top 20s and Top 10s. For instance, if you want your chart to rank notebooks that have 120-MHz processors and 1.6GB hard drives, the guide's Personal Adviser will find and rank all the machines that fit your specifications.

PC WORLD

TOP 20 POWER DESKTOPS

	SYSTEMS	Last month	Month tested	Street price (8/15/97)	CPU	Comments
1	Dell Dimension XPS D266 800/388-8542 www.dell.com	–	NEW	$3099	Pentium II-266	D series replaces H line, adds AGP graphics; Pentium II-300, 233 also good.
2	Dell Dimension XPS M233s 800/388-8542 www.dell.com	2	Sept 97	$2629	Pentium MMX-233	Top service and reliability ratings, best PMMX-233 speed, big hard drive.
3	Dell OptiPlex GXa266 800/388-8542 www.dell.com	–	NEW	$2865	Pentium II-266	Quick, great design, ethernet and AGP, top reliability and service ratings.
4	Gateway 2000 G6-233 800/846-2000 www.gateway.com	3	Aug 97	$2839	Pentium II-233	Fast, loaded system with wavetable audio and great documentation.
5	Gateway 2000 G6 300XL 800/846-2000 www.gateway.com	–	NEW	$3799	Pentium II-300	Fastest-ever performance, AGP graphics, great 19-inch monitor, terrific sound.
6	Quantex QP6/266 SM-4X 800/896-4898 www.quantex.com	–	July 97	$2899	Pentium II-266	Blazing-fast Pentium II comes with very sharp screen.
7	Micron Millennia Mme with Fusion 3D 888/634-8799 www.micronpc.com	–	NEW	$2689	Pentium MMX-233	Fast, special 3D graphics accelerator, Zip drive, business and games software.
8	Gateway 2000 G5-233 800/846-2000 www.gateway.com	5	Sept 97	$2464	Pentium MMX-233	New Pentium IIs demote former Best Buy; full multimedia, 56-kbps x2 modem.
9	Dell OptiPlex GXi 5233 800/388-8542 www.dell.com	–	Sept 97	$2784	Pentium MMX-233	LAN-ready desktop trails fastest PMMX-233s—but reliability, support are tops.
10	Sys Technology Sys Performance 233K6 800/613-9963 www.systechnology.com	–	NEW	$2721	AMD K6-233	Beats PII-233s on business apps, well designed; support could be better.
11	Dell OptiPlex GXpro 200 800/388-8542 www.dell.com	7	July 97	$3407	Pentium Pro-200	Big $342 price drop on corporate PC. Pentium Pros will be phased out soon.
12	Micron Millennia XKU 300 888/634-8799 www.micronpc.com	–	NEW	$4187	Pentium II-300	Top-flight performer has great 19-inch monitor, super sound, AGP graphics.
13	NMC Expert Pro II 800/800-4662 www.natmicro.com	8	Sept 97	$2595	Pentium II-266	Newer, stronger systems overtake this very fast PC; minimal support policies.
14	Sys Technology Performance Pro 266A 800/613-9963 www.systechnology.com	9	Oct 97	$3249	Pentium II-266	Fast minitower has big hard drive, great multimedia; policies could be better.
15	IBM PC 300 XL PII-266 800/426-2968 www.pc.ibm.com	–	NEW	$3785	Pentium II-266	PC 350 replacement is faster, has fine design, locking cover, integrated sound.
16	Nova PII-266 800/461-5535 www.novacominc.com	–	NEW	$2674	Pentium II-266	Fast, well built, expandable, good Roland speakers, Corel WordPerfect Suite.
17	Premio FX2 Shadowhawk 266 800/677-6477 www.premiopc.com	11	Oct 97	$2750	Pentium II-266	Fast PII-266 has 64MB of RAM, good sound; no modem.
18	Digitron PS4000 888/708-2800 www.digitronpc.com	14	Oct 97	$3995	Pentium II-266	Speedy, great multimedia, outstanding expandability; expensive.
19	Intergraph TD-225 800/763-0242 www.intergraph.com	–	Aug 97	$3020	Pentium II-266	Whopping $396 price drop, fast, fine multimedia setup.
20	Total Peripherals Archer 2000A 800/923-7718 www.totalpc.com	19	Aug 97	$2499	Pentium MMX-200	Inexpensive, well appointed, good design and graphics; no weekend support.

Best Buy See features chart, page 270; test report, page 274. Recommended as home system

[1] Insufficient data.

NEW MACHINES RESHAPE THIS MONTH'S Top 20. Almost half the systems are new, including the first Pentium II-300s. IBM and Micron—gone from our chart for a month while they refreshed their product lines—come back strong here with attractive new models. Dell and Gateway 2000 maintain a hold on the top of the chart, with three new models claiming Best Buys. Systems based on Pentium Pro processors are almost gone—expect the last to disappear by next month. We also looked at Hewlett-Packard's new Pavilion 8160, a home system based on a Pentium MMX-233 processor, which didn't make our chart. For more on this machine, visit PC World Online (www.pcworld.com/t20pcs).

SCORECARD

★ Overall rating	PC WorldBench score/performance	Vendor's system reliability	Features and design	Price	Vendor's support quality/policies	Reader service number
90	264/outstanding	best	outstanding	average	best/best	604
89	243/good	best	outstanding	very inexpensive	best/best	605
86	259/very good	best	good	inexpensive	best/best	606
86	251/good	fair	outstanding	inexpensive	best/best	607
84	272/outstanding	fair	outstanding	expensive	best/best	608
83	259/very good	good	good	inexpensive	good/best	609
82	241/good	good	good	inexpensive	best/best	610
81	240/good	fair	very good	very inexpensive	best/best	611
81	232/satisfactory	best	good	inexpensive	best/best	612
81	251/good	[1]	outstanding	very inexpensive	[1]/poor	613
81	230/satisfactory	best	good	average	best/best	614
81	270/outstanding	good	outstanding	expensive	best/best	615
78	260/very good	[1]	very good	very inexpensive	[1]/fair	616
77	264/outstanding	[1]	very good	expensive	[1]/poor	617
77	264/outstanding	fair	good	average	fair/good	–
77	260/very good	[1]	good	inexpensive	[1]/fair	618
76	257/very good	[1]	good	inexpensive	[1]/poor	619
75	259/very good	[1]	outstanding	expensive	[1]/poor	620
74	260/very good	[1]	good	inexpensive	[1]/fair	621
73	237/good	[1]	very good	very inexpensive	[1]/fair	622
Scorecard weightings ▶	Performance 25 percent	Reliability 25 percent	Features 20 percent	Price 15 percent	Support 15 percent	All products: 901

This Month's Best Buys

1 DELL DIMENSION XPS D266

PRO: Fast, fine design, huge hard drive, best reliability and support ratings

CON: Awkward monitor controls

This well-equipped, cutting-edge Pentium II-266 combines superb performance with the outstanding reliability and service that consistently keep Dell PCs near the top of our charts. The new Dimension XPS D266 replaces the former number one, the Dimension XPS H266. (Dell has discontinued its Dimension XPS H line starting this month.) The new D line switches to Intel's new, more advanced 440LX chip set and provides Accelerated Graphics Port graphics. AGP promises to speed video processing using a dedicated graphics bus that can move data twice as fast as PCI. Segregating the video on a separate bus is also designed to free the PCI bus for other work—such as handling storage I/Os. All this sounds great in theory, but we haven't seen much of a real-world benefit so far. The first AGP systems we have tested, which also include the Gateway and Micron Pentium II-300 systems this month, *are* superb performers, although they're not substantially faster at running business applications than are similarly configured systems that use PCI graphics. With a PC WorldBench score of 264, the $3099 XPS D266 is only 3 percent slower than the fastest PC tested so far, the Gateway 2000 G6 300XL. Performance that's close to the best is bound to entice power users.

In addition, you can buy the XPS D models in 233- and 300-MHz versions. We also tested the Pentium II-300. It produced a PC WorldBench score of 270—outstanding, but only about 2 percent faster than the Pentium II-266. We think the D266 is a better value, unless you *must* have bragging rights for the top CPU and don't mind paying an extra $200.

For the most part, the D266 is top-drawer: You get 64MB of SDRAM—enough to keep the system purring happily along while it handles several programs running multimegabyte files. The fast Ultra DMA IBM hard drive has room for 8.4GB of programs and data, and it's paired with a bus-master IDE controller for super-efficient disk access. The NEC CD-ROM drive reads at speeds from 12X to 24X, and the 3Com/U.S. Robotics internal Sportster modem downloads at close to 56 kilobits per second. Even the Sound Blaster AWE64 sound board is top-of-the-line, with hardware wavetable and full-duplex capabilities that allow you to record digital audio tracks while listening. And in spite of this plentiful pile of peripherals, the minitower offers four empty drive bays and four free expansion slots. ▶

Dell Dimension XPS D266

PHOTOGRAPHS: KEN SMITH

TOP 20 POWER DESKTOPS — STANDARD FEATURES

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor tube/ viewable diagonal (inches)	Screen pitch (mm)	CD-ROM drive speed
1	Dell Dimension XPS D266*	Pentium II-266	64	512	8.4	ST8 Velocity 128 3D	4/VRAM	17/15.9	.28	12X-24X
2	Dell Dimension XPS M233s*	Pentium MMX-233	32	512	6.4	Matrox Millennium II	8/WRAM	17/15.7	.28	12X-24X
3	Dell OptiPlex GXa266*	Pentium II-266	32	512	3.2	integrated ATI 3D Rage Pro	4/SGRAM	17/15.8	.26	12X-24X
4	Gateway 2000 G6-233*	Pentium II-233	64	512	3.2	STB Virge 4MB 3D PCI	4/VRAM	17/15.9	.28	12X-16X
5	Gateway 2000 G6 300XL*	Pentium II-300	64	512	8.4	STB Velocity 128 3D	4/SGRAM	19/18	.28	12X-24X
6	Quantex QP6/266 SM-4X	Pentium II-266	32	512	4.3	Matrox Millennium II	4/WRAM	17/16.1	.25	12X
7	Micron Millennia Mme with Fusion 3D	Pentium MMX-233	32	512	3.1	Diamond Stealth 3D 2000 Pro [2]	4/EDO DRAM	17/15.8	.26	12X-24X
8	Gateway 2000 G5-233	Pentium MMX-233	32	512	4.1	STB Virge 4MB 3D PCI	4/VRAM	17/16	.28	12X-24X
9	Dell OptiPlex GXi 5233	Pentium MMX-233	32	256	3.2	Matrox Millennium	4/WRAM	17/15.4	.26	8X
10	Sys Technology Sys Performance 233K6	AMD K6-233	32	512	6.4	Number Nine Revolution 3D	8/WRAM	17/15.9	.26	12X-24X
11	Dell OptiPlex GXpro 200	Pentium Pro-200	32	512	3.1	Matrox Millennium	4/WRAM	17/15.8	.28	8X
12	Micron Millennia XKU 300	Pentium II-300	64	512	6.4	Diamond Viper 330	4/SGRAM	19/18	.22	12X-24X
13	NMC Expert Pro II	Pentium II-266	64	512	5.1	Matrox Millennium II	4/WRAM	17/15.9	.28	12X-16X
14	Sys Technology Performance Pro 266A	Pentium II-266	32	512	6.4	Number Nine Revolution 3D	8/WRAM	17/15.8	.26	12X-16X
15	IBM PC 300 XL PII-266	Pentium II-266	32	512	4.1	Matrox Millennium	4/WRAM	17/15.7	.28	12X-16X
16	Nova PII-266	Pentium II-266	64	512	5.1	Matrox Millennium II	4/WRAM	17/16.1	.26	12X-24X
17	Premio FX2 Shadowhawk 266	Pentium II-266	64	512	3.2	ATI 3D Pro Turbo PC2TV	4/SGRAM	17/15.9	.28	8X
18	Digitron PS4000	Pentium II-266	32	512	4.3	STB Velocity 3D Video	4/VRAM	17/16.1	.25	12X-16X
19	Intergraph TD-225	Pentium II-266	32	512	3.5	Matrox Millennium	4/WRAM	17/15.8	.27	12X
20	Total Peripherals Archer 2000A	Pentium MMX-200	32	512	4.1	Matrox Millennium	4/WRAM	17/15.5	.28	12X-18X

* Best Buy [1] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology. [2] Also includes Diamond Monster 3D card to accelerate 3D applications.

We were less impressed with Dell's economy-model 1000LS 17-inch monitor, built around a Philips tube—although it's a big improvement over its predecessor. The image quality is quite good for a basic model, but the controls could be better. Push one of the four buttons, and a menu appears on screen, but if you hesitate a moment while trying to figure out how to make image adjustments, the menu disappears, forcing you to start over.

The Altec Lansing ACS 290 subwoofer-equipped speakers—a $75 upgrade from the more basic ACS 90 system—sounded bass-heavy and a bit muddy to our ears, no matter how we tweaked the components. True sound aficionados should spend $49 more and get Dell's top speaker offering, the ACS 490 setup.

2 DELL DIMENSION XPS M233S

PRO: Fastest Pentium MMX-233 system tested so far, large hard disk, Zip drive

CON: RAM maxes out at 64MB

The Dimension XPS M233s holds firm as our number two Best Buy for the third month running, thanks to its combination of good price and strong performance. This $2629 minitower produced a PC WorldBench score of 243—still the fastest result we've seen from any system we've tested that has a Pentium MMX-233 processor. Beyond good performance for the price, you get a big 6.4GB hard drive, a 56-kbps x2 modem, an internal Zip drive with three free cartridges, and a fine Matrox Millennium II graphics card with a hefty 8MB of WRAM. This larger complement of video memory is a nice hedge against the day when you may need to display true color at a really high resolution, such as 1280 by 1024 or 1600 by 1200. In addition, the integrated 16-bit audio chip combines with the Altec Lansing ACS 90 speakers to produce good sound. To cap off the deal, Dell now ships the unit with a new, low-cost 17-inch 1000LS monitor that has better image quality than its predecessor. We did find the controls on the newer-model monitor to be a bit hard to use, however.

Dell Dimension XPS M233s

We liked the case design of the XPS M233s. You won't mistake the

		EXPANDABILITY						CUSTOMER SUPPORT			
Modem speed (kbps)	Sound board	Case style	Max. RAM (MB)	Maximum secondary cache (K)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
56 [1]	Sound Blaster AWE64	minitower	384	512	2	3/1	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	integrated	minitower	64	512	1	2/2	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
–	integrated Crystal Audio	minitower	384	512	2	2/1	7	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	Ensoniq Audio PCI Wavetable	minitower	256	512	2	3/2	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	Ensoniq ESI370 Audio PCI	tower	384	512	1	3/5	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	integrated Yamaha OPL3-Sax	tower	128	512	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
56 [1]	integrated Yamaha OPL-3	minitower	256	512	1	2/1	3	3/1	24	Sat., Sun.	BBS, CIS, WWW
56 [1]	Ensoniq Audio PCI Wavetable	minitower	256	512	1	3/2	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
–	Sound Blaster AWE32 PnP	desktop	512	512	3	1/1	3	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	Sound Blaster 32 PnP	minitower	512	512	5	3/2	3	varies [3]/1	24	Sat., Sun.	–
33.6	Vibra 16s	desktop	512	512	3	1/1	3	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	Sound Blaster AWE64	minitower	384	512	1	2/0	3	3/1	24	Sat., Sun.	BBS, CIS, WWW
33.6	Sound Blaster CT 3600	minitower	384	512	4	1/1	4	3/3	9	–	WWW
33.6	Sound Blaster 32 IDE PnP	minitower	768	512	4	3/2	4	varies [3]/1	24	Sat., Sun.	–
–	integrated Crystal PnP Audio	desktop	384	512	2	1/1	2	3/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
56 [1]	integrated	minitower	128	512	2	3/0	4	3/3	8	–	WWW
–	Sound Blaster AWE32 PnP	tower	1024	512	3	2/0	5	3/3	9	–	BBS, WWW
33.6	Sound Blaster AWE64 CT4380	minitower	1024	512	6	3/1	4	1/1	9	Sat.	WWW
33.6	Ensoniq Audio S5016	minitower	512	512	6	1/2	4	3/1	12	–	BBS, WWW
33.6	Sound Blaster 32 PnP	minitower	128	512	4	3/0	4	3/1	9	–	BBS, WWW

[3] Six years on CPU and main RAM, one to five years on other parts.

panel's reset button for an on/off switch, as you might with some of the older Dimension designs. Color-coded I/O ports make monitor and mouse installations quick and easy—even for the novice user. And getting into the case is a snap: Just undo a single thumbscrew and remove the cover. The PC's interior is clean and free of clutter, with all the cables neatly bundled and out of the way. The motherboard sports a pair of Universal Serial Bus ports (though the system doesn't come with any compliant peripherals). The software bundle is composed of applications you're likely to find useful: Microsoft Office 97 Small Business Edition, along with Publisher and Photo Editor.

If the XPS M233s has a drawback, it's in RAM expandability. You can install more than 64MB, but Dell advises against it. Why? The system uses Intel's 440FX chip set, which Dell says is capable of caching memory accesses only to the lowest 64MB of RAM. So increasing RAM over 64MB could actually result in worse performance. Granted, most users won't need more than 64MB of RAM, but if the limitation worries you, consider a Pentium II using Intel's new 440LX chip set—for example, the Dimension XPS D266, which allows RAM to be expanded to a whopping 384MB.

Dell's documentation is top-notch, and responsive tech support is available around the clock. The warranty covers parts for three years and labor for one, and our readers consistently rate Dell's service and system reliability as top-of-the-line.

3 DELL OPTIPLEX GXA266

PRO: Great design, fine Trinitron monitor, highly expandable, built-in ethernet adapter, integrated AGP graphics, best reliability and support ratings

CON: No modem, skimpy software bundle

Dell's OptiPlex systems are aimed at networked corporate environments—especially offices where sensible design and reasonable price matter more than the very latest in technology. The new OptiPlex GXa266 holds to that course, varying only to include an integrated 2MB AGP graphics controller. The good news is that the GXa266 doesn't make you give up much performance for its button-down stability: With its PC WorldBench score of 259, it's within 2 percent of the speed of a comparably equipped Dimension XPS D266. Ser- ▶

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NOS Support (3 incident resolutions/1st year), 7x24

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Bus. Lease $160/mo.

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Memory upgradable to 1GB (8 DIMM slots)
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Integrated Adaptec PCI Ultra Wide SCSI-3 controller
Integrated Intel EtherExpress Pro 100 controller
12X variable speed SCSI-2 CD-ROM drive
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1 (one) 330 wart power supply standard (upgradable to 3 for added redundancy)
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Intel LANDesk Server Manager 2.52
Dedicated server technical support, 7x24
5-year/3-year Micron Power limited warranty
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Intel 166MHz Pentium processor with MMX™ technology
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16MB EDO RAM, support for SDRAM
1.2GB SMART EIDE hard drive
3.5" floppy drive
3Com 3C509 ISA Ethernet T-P NIC
16X EIDE variable speed CD-ROM drive
S3 ViRGE graphics accelerator, 2MB EDO RAM
15" Micron 500Lx, .28dp (13.7" display)
Microsoft Windows 95
5-year/3-year Micron Power limited warranty

$1,499
Bus. Lease $49/mo.

CLIENTPRO MRE

Intel 200MHz Pentium processor with MMX technology
512KB pipeline burst cache, flash BIOS, DMI 2.0
32MB SDRAM
2.1GB Ultra ATA SMART EIDE hard drive
3.5" floppy drive
Pro 100 with Wake On LAN Network Adapter
16X EIDE variable speed CD-ROM drive
S3 ViRGE graphics accelerator, 2MB EDO RAM
15" Micron 500Lx, .28dp (13.7" display)
Microsoft Windows 95
Intel LANDesk Client Manager
5-year/3-year Micron Power limited warranty

$1,749
Bus. Lease $60/mo.

CLIENTPRO XLU

Intel 266MHz Pentium II processor with MMX technology
512KB internal L2 secondary cache, DMI support
32MB EDO RAM
2.1GB SMART EIDE hard drive
3.5" floppy drive
3Com PCI 10/100 ethernet NIC
16X EIDE variable speed CD-ROM drive
PCI 64-bit 3D video, MPEG, 4MB EDO RAM
17" Micron 500FGx, .28dp (13.7" display)
Upgradable wavetable audio with speakers
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Microsoft Windows NT Workstation
Intel LANDesk Client Manager
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vice professionals will appreciate the terrifically easy access to the system's innards. And according to Dell, the company puts all its new OptiPlex models through an exhaustive round of network hardware and software compatibility tests before releasing them for sale.

At $2865, the OptiPlex GXa266 is a cool $696 pricier than the new OptiPlex Gn+233, which earns a Budget Best Buy this month. What do you get for the extra dough? Better performance, from a Pentium II-266 CPU as opposed to a Pentium MMX-233; a roomy minitower case rather than a desktop; a 17-inch Dell Trinitron monitor instead of a 15-incher; and a nicer keyboard. Both systems provide a 3.2GB hard drive, an NEC 12X–24X CD-ROM drive, integrated ethernet adapters, and 16-bit sound. The GXa266 adds an Altec Lansing ACS 290 speaker set with a subwoofer that yields somewhat muddy bass notes. Neither OptiPlex is priced with a software bundle or a modem, however.

Dell OptiPlex GXa266

The coolest thing about the GXa266 is its clever design. There are three unoccupied drive bays and seven free slots, and getting to them couldn't be easier. ▶

TOP 20 POWER DESKTOPS

TEST REPORT

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	PC WorldBench score
1	Dell Dimension XPS D266*	Pentium II-266	64	512	264
2	Dell Dimension XPS M233s*	Pentium MMX-233	32	512	243
3	Dell OptiPlex GXa266*	Pentium II-266	32	512	259
4	Gateway 2000 G6-233*	Pentium II-233	64	512	251
5	Gateway 2000 G6 300XL*	Pentium II-300	64	512	272
6	Quantex QP6/266 SM-4X	Pentium II-266	32	512	259
7	Micron Millennia Mme with Fusion 3D	Pentium MMX-233	32	512	241
8	Gateway 2000 G5-233	Pentium MMX-233	32	512	240
9	Dell OptiPlex GXi 5233	Pentium MMX-233	32	256	232
10	Sys Technology Sys Performance 233K6	AMD K6-233	32	512	251
11	Dell OptiPlex GXpro 200	Pentium Pro-200	32	512	230
12	Micron Millennia XKU 300	Pentium II-300	64	512	270
13	NMC Expert Pro II	Pentium II-266	64	512	260
14	Sys Technology Performance Pro 266A	Pentium II-266	32	512	264
15	IBM PC 300 XL PII-266	Pentium II-266	32	512	264
16	Nova PII-266	Pentium II-266	64	512	260
17	Premio FX2 Shadowhawk 266	Pentium II-266	64	512	257
18	Digitron PS4000	Pentium II-266	32	512	259
19	Intergraph TD-225	Pentium II-266	32	512	260
20	Total Peripherals Archer 2000A	Pentium MMX-200	32	512	237

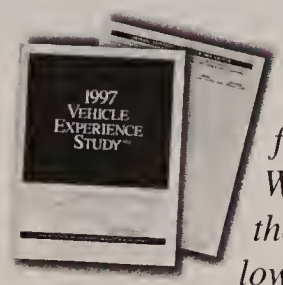
*Best Buy

Word 7.0 for Windows 95
Excel 7.0 for Windows 95
Picture Publisher 6.0 for Windows 95
Paradox 5.0 for Windows
WordPerfect 6.1 for Windows
1-2-3 release 5 for Windows

HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

Looks aren't everything.

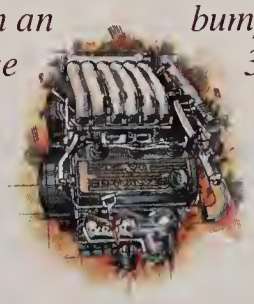
See?



Dodge Avenger's looks are, first and foremost, deceiving. While it looks like the quintessential low-slung-style-is-everything sport coupe, it is, in fact, one of the most thoughtful cars in its category.[1] Not to mention the roomiest. No wonder Avenger tied for top honors to win Strategic Vision's 1997 Total Quality Award™ for "Best Ownership Experience" in its class.[2]

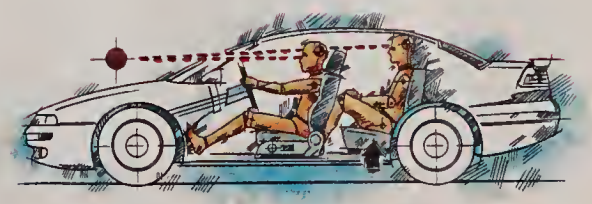
And for all the right reasons.

Avenger's double-wishbone suspension optimizes the delicate relationship between a quiet, comfortable ride and quick, predictable handling. And quietly hiding under that well-sloped hood is an available 24-valve V-6 with an ability to quickly turn merge lanes into express lanes.



As for the folks in back, they're accommodated in sedan-like comfort. Because the seats are elevated, everyone gets a great look at the road. With a dozen vents to help keep all of you nice and comfortable.

More good news: Avenger is covered from one handsome end to the other by our Customer One Care™ 3-year or 36,000-mile bumper-to-bumper warranty and 3/36 Roadside Assistance.[3]



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[1]Ward's Middle Specialty Segment. All comparisons based on data available at time of printing. [2]Avenger tied among Lower-Priced Sports Cars. Strategic Vision's 1997 Vehicle Experience Study™ surveyed 31,521 Oct.-Nov. new vehicle buyers of 200+ models after the first 90 days of ownership. [3]See limited warranty & restrictions at dealer. Excludes normal maintenance & wear items.

Always use seat belts.
Remember a backseat is the safest place for children.

Avenger The New Dodge

Once you get the case removed, all you have to do is lift a lever, and the entire circuit board holding the expansion slots slides right out of the machine. Reinstalling it after you add or remove cards is just as easy. And the entire power supply swivels up and out of the way for easy access to memory and the CPU.

4 GATEWAY 2000 G6-233

PRO: Excellent documentation, nice design

CON: Drive bays can be tough to access

At $2839, Gateway 2000's G6-233 is a terrific value for the performance-minded buyer. With a PC WorldBench score of 251, this Pentium II-233 minitower provides good performance, within about 4 percent of the speed of the average Pentium II-266. The G6-233 comes well appointed with 64MB of EDO DRAM and 512K of secondary cache. Our test unit came with a 16-bit Ensoniq Audio PCI Wavetable sound card and Altec Lansing speakers with a subwoofer. The Altec Lansings sound good, but the Boston Acoustics speakers Gateway has recently added to its lineup are better—especially if you're using your PC to play music and games. The STB Virge 4MB 3D PCI graphics card should help speed the 3D graphics you'll find in many recent games. You also get a 3.2MB Ultra DMA hard drive and a 56-kbps x2 modem.

The G6-233 offers plenty of room for expansion. Large thumbscrews make getting inside the case easy, and we liked the color-coded I/O ports. The drawbacks we found in reviewing this machine are minor: We had to undo thumbscrews on the case's right side panel to remove the drive cages, and the hard disk occupies the most accessible of the internal bays.

Gateway 2000 G6-233

Gateway clearly did its homework putting together its documentation. The manuals are thorough, clearly written, beautifully illustrated, and printed on glossy paper. Our readers rank Gateway's system reliability as only fair, but support receives top scores: You get a three-year warranty on parts and labor, plus round-the-clock toll-free tech support.

5 GATEWAY 2000 G6 300XL

PRO: Blazingly fast, high-quality 19-inch monitor, great sound, very expandable

CON: Expensive

If you're looking for the fastest PC you can buy, you're gonna love the Gateway 2000 G6 300XL. From its Pentium II-300 CPU, which kicked it along to a record-setting PC WorldBench score of 272, to its big 19-inch monitor and AGP graphics, this system is state-of-the-art. And you pay for it—$3799, the third highest price on our chart.

Gateway 2000 G6 300XL

The first thing we noticed about the 300XL was the crisp, impressive EV900 display that Gateway sent with it. It's built around a Hitachi tube and has a whopping 18-inch viewable area and a footprint smaller than some 17-inchers'. The monitor not only puts about 25 percent more on screen than the typical 17-incher, it also has remarkably good text and graphics. Driving this wonderful display is a newly released STB Velocity 128 3D with 4MB of SGRAM—one of the first AGP video boards we've seen.

The 300XL also sounds good. An Ensoniq ESI370 Audio PCI card and Boston Acoustics speaker/subwoofer combo deliver quality good enough to please even audiophiles. Our only caveat—the Ensoniq card steals from main memory to store its wavetable; you can use 2MB, 4MB, or 8MB tables. This isn't a major problem considering the machine's 64MB of RAM, but with today's memory-hogging programs you may see a slight degradation in performance when you have a lot of apps running.

Like all Gateway 2000 systems, the 300XL is well built. Since it's a full-size tower, there's plenty of elbowroom inside for repairs and upgrades; more drive bays are available than you'll ever use. Not that you'll need to expand storage right away—the 8.4GB IBM Ultra DMA drive and bus-master IDE controller should hold you for a while.

Gateway also bundles a very nice selection of software, including Microsoft Office 97 Small Business Edition, Microsoft Encarta 97, and a number of games. Rounding out the system are a Telepath 56-kbps x2 modem with voice mail and a 12X–24X CD-ROM drive.

Gateway's support package includes a three-year warranty on parts and labor, plus an around-the-clock toll-free technical support line. Our readers rate the quality of Gateway's support as among the best, but system reliability rates only fair. The illustrated documentation is thorough and well written, and loads of help is also available on Gateway's Web site.

New This Month

The following PCs made our Power Desktops chart for the first time this month. For brief reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

7 MICRON MILLENNIA MME WITH FUSION 3D

PRO: Good 3D performance, best service rating, internal Zip drive

CON: A few stray cables inside the case

Micron's Millennia Mme with Fusion 3D minitower proves that you can't judge a book by its cover—or its price. This plain, putty-colored PC seems like any other business box. But a closer look reveals this reasonably priced $2689 system to be a dazzling combination of first-class multimedia components, thoughtful design, and top-rated service.

The Millennia Mme with Fusion 3D will handle any business app, as shown by its good PC WorldBench score of 241—which is above average for a Pentium MMX-233. But the Mme can also handle some of the toughest computing of all. games. Don't laugh—the 3D graphics in the current crop of PC games really stress the average PC. The Millennia Mme overcomes 3D

Micron Millennia Mme

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Circle 250 on reader service card

overload by providing two video cards that work together: a 4MB Diamond Stealth 3D 2000 Pro for the main graphics duties and a 4MB Diamond Monster 3D for smooth 3D images.

The company throws in a 17-inch Micron 700FGX monitor—a reasonably good complement to this high-end graphics array. To complete the multimedia package, the system has a 12X–24X CD-ROM drive, integrated Yamaha OPL-3 audio, and a pair of nice-sounding Advent Power Partners 270G speakers. This PC has plenty of storage space on its 3.1GB hard disk, and its internal Iomega Zip drive (which comes with two 100MB cartridges) will be handy for archiving and sharing files. The internal 3Com/U.S. Robotics Sportster 56-kbps x2 fax-modem and bundled starter-pack software for online service providers will get you hooked up to the Internet.

Sys Performance 233K6

If you want proof that the system isn't only for fun and games, consider the software bundle: You get Microsoft Office 97 Small Business Edition, which includes word processing, spreadsheet, scheduling, presentations, and small-business financial management apps. And after hours (or when the boss isn't looking), you can delve into the Xcitement Pack, which includes Adobe's PhotoDeluxe program and UbiSoft's Pod—a racing game optimized for MMX.

The Mme has a good case design and clearly labeled I/O ports. One quibble: It's too easy to confuse the power and reset buttons. The interior is relatively clutter-free, although a couple of cables dangle in front of two of the free drive bays. You have three available slots and easy access to the available DIMM socket.

Micron's user guide is well organized and has helpful diagrams, but we wish it had an index. Technical support is available round the clock. The company backs its PCs with a warranty of five years on the main RAM and CPU, three years on the other parts, and a year of free on-site service. Our readers give Micron's service glowing reviews, rating it best. They rate the company's system reliability as good.

10 SYS TECHNOLOGY SYS PERFORMANCE 233K6

PRO: Fast, sturdy, big hard drive

CON: Warranty varies depending on the component, monitor controls could be easier to use

At $2721, Sys Technology's Sys Performance 233K6 packs a lot of value. The combination of a relatively inexpensive AMD K6-233 CPU with a very fast IBM Ultra DMA hard drive results in a machine whose performance rivals that of much more expensive Pentium II systems. In fact, its PC WorldBench score of 251 is only about 4 percent slower than that of the average Pentium II-266 PC we've reviewed. Yet the 233K6's price beats the 266-MHz system's average cost by almost 30 percent. That makes for a highly tempting value. And you don't have to settle for cut-rate components. The 6.4GB IBM hard drive, for example, is one of the best available.

Sys put this PC together well. Its wide-body minitower design is exceptionally sturdy and stable, and it provides plenty of room inside to maneuver when doing upgrades or repairs. It features round, sleeved cables instead of the bulky ribbon types found in most systems. The machine is also well ventilated, with a total of three fans—one on the CPU, another on the power supply, and yet another on a vent for the case.

The 17-inch Sys monitor provides a sharp, clear picture, and its controls are fairly extensive, although it took a lot of fiddling to get the screen geometry exactly the way we wanted it. The good display is more than matched by the impressive 128-bit Number Nine Revolution 3D video card with 8MB of WRAM on board.

System documentation could be better. It consists of component manuals with no unifying user guide. If you're technically adept, you probably won't be bothered by this approach, but average users will have a hard time finding the information they need. We have little fax-back information on the quality of Sys Technology's support or the overall reliability of its PCs. The Performance 233K6's warranty is a mixed bag: Labor and on-site service are free for one year, and parts are covered for different periods depending on their manufacturers' policies. The CPU and memory (the parts least likely to fail) are covered for six years, and the other parts are covered for one to five years. You get toll-free technical support around the clock for the first year, but then support drops to 9 hours per weekday, and you pay the toll.

12 MICRON MILLENNIA XKU 300

PRO: Fast, AGP graphics, Zip drive, high-quality 19-inch monitor, great speakers

CON: Expensive

This PC is very attractive, although it's hard to justify spending $4187 unless you really need all the extras. This well-built system features breathtaking performance, a luxurious set of components, Micron's good system reliability, and top-notch technical support.

The Millennia XKU 300 scored a terrific 270 on our PC WorldBench test suite, just two points shy of the pack-leading Gateway 2000 G6 300XL. And the XKU comes with a great 19-inch Hitachi monitor, which features crisp text and good-looking graphics from corner to corner. In fact, we review the new Hitachi 19-incher in this month's Top 10 Monitors—and it makes a strong showing, combining relatively low cost with very good image quality that help it rate more highly than several larger monitors. With this display, you should be able to step up to 1280 by 1024 resolution without giving yourself a case of eyestrain.

Micron Millennia XKU 300

The built-in Zip drive is another nice addition; you can use it for backing up your files and folders and for sharing and transporting data. And the system includes AGP graphics—the latest in high-performance video bus technology (although *PC World* testing doesn't give AGP a clear edge over PCI graphics for business applications). In addition, you get a big 6.4GB hard drive with a bus-master controller, a 12X–24X CD-ROM drive, 64MB of RAM (expandable to ▶

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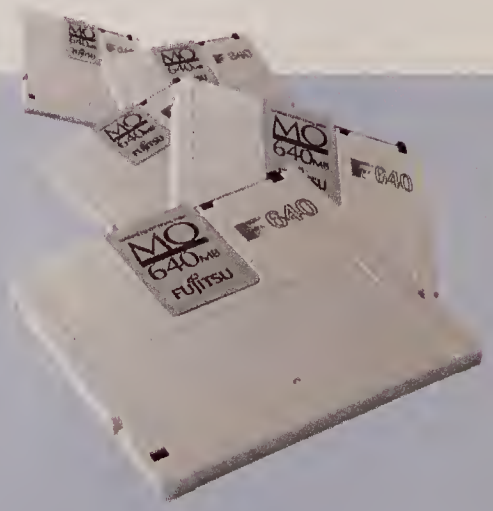

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a whopping 384MB), and a fast 3Com/U.S. Robotics Sportster 56-kbps modem.

The XKU is also set up to entertain, with the popular full-duplex Sound Blaster AWE64 card that has hardware wavetable and lets you record digital audio while listening. The Cambridge Soundworks audio system includes a subwoofer and satellite speakers and actually sounds better than many home stereos. With all this high-end technology, plus a roomy and accessible minitower case with excellent expandability (two open drive bays and three free slots), there's really nothing but that very high price to keep you from reaching for your wallet.

This month we also looked at Micron's $3999 Millennia XRU with Fusion 3D. That Pentium II-266 system is similar in value to the XKU, though it lacks AGP and has a smaller hard drive. It includes a Diamond Monster 3D card to accelerate 3D applications and should appeal to gamers who don't mind spending extra for a high-end machine. At press time we learned the XRU models will be available for only a short time after you read this.

15 IBM PC 300 XL PII-266

PRO: Fast, gorgeous monitor, ethernet adapter

CON: Expensive, dinky speakers

IBM generally makes beautifully designed and handsomely constructed products, and this high-end corporate system is no exception. If IBM's PC reliability and support quality rated higher than fair with readers, the IBM PC 300 XL PII-266 would stand much higher on our Power chart—despite its expensive $3785 price.

IBM 300 XL PII-266

Aimed squarely at business power users, especially those in large corporations with networked offices, this system does not attempt to spare the horses. It's built around a blazing 266-MHz Pentium II processor, and it produced a PC WorldBench score of 264. That's within 3 percent of the 272 rung up by the Gateway 2000 G6 300XL we review this month—the fastest desktop we've tested so far. But terrific performance isn't the only thing this system brings to the party.

As part of the computer's appeal to corporate users, a PCI ethernet adapter comes standard. But IBM doesn't make you settle for only a LAN connection. The company also throws in its management software, which should make it a snap for your LAN administrator to remotely power up (or down) and install and update software. To make sure you get a clear picture, IBM offers a 4MB Matrox Millennium video card and a stunningly sharp 17-inch IBM P70 monitor. The IBM P70 placed well on our last Top 10 17-inch monitors chart in September. With the P70, we couldn't detect the slightest hint of flicker or distortion, even at the corners of the display; this monitor will keep your eyes happy through the end of a long day spent staring at the screen.

Nova PII-266

With the exception of a pair of small, tinny-sounding WaveSonic speakers, the PC 300 XL's components are good: You get a 12X–16X CD-ROM drive, a roomy 4.1GB hard drive with bus-master IDE controller, and a great keyboard.

The attractive desktop case features an art-deco curve to its face, and while it's small enough to fit on even a crowded desk, it's still reasonably expandable. Like many corporate systems these days, the PC 300 XL doesn't come with a big helping of bundled business applications. But IBM throws in MessageCenter, QuickLink III, NetNanny, and IBM Commercial Desktop, with support for voice commands, voice mail, and fax. IBM's documentation is clear and well illustrated, and there's copious on-screen help. The warranty covers parts for three years and labor for one; toll-free support is available around the clock.

16 NOVA PII-266

PRO: Fast, good speakers and software bundle

CON: No weekend tech support

Nova's PII-266 is a combination of powerful hardware and good software, delivering a lot of system for the money to buyers in small and home offices. The price is right: $2674 for a fast Pentium II-266 with a very good PC WorldBench score of 260. The Nova comes with high-quality components and a healthy offering of office applications.

The Nova's wide minitower case is sturdy, roomy, and stable. However, a broad crossbar that increases the strength of the case also makes getting at some of the system's components a bit awkward. We discovered that tipping the case over on its side made for easier access.

With the Nova, the peripherals provide much of the spice. We like the 17-inch MAG InnoVision DJ707 monitor, which has good image quality and a unique all-in-one control dial that's among the easiest to use on the market. The monitor teams up well with the 4MB Matrox Millennium II graphics card.

Surprisingly powerful 16-bit sound is integrated on the motherboard, and Nova also includes a very good pair of Roland MA-8 speakers, which were able to provide good bass response without a separate subwoofer. A 12X–24X CD-ROM drive completes the array of multimedia peripherals. For communications, the company includes a 3Com/U.S. Robotics Sportster internal 56-kbps x2 fax-modem. Nova also bundles Corel WordPerfect Suite 8—a robust office suite that includes WordPerfect, Quattro Pro, Corel Presentations, the Corel Central personal information manager, and a nice assortment of clip art and fonts.

Nova's support policies are mixed. The three-year parts and labor warranty is very good, but toll-free phone support is available only 8 hours per weekday. That leaves you without any live support on weekends. The documentation includes a helpful user guide and a fairly techie assortment of component manuals. ▶

Beyond the Top 20

We evaluated this system along with the others, but it didn't score high enough to reach the Top 20 Power Desktops chart. For its write-up, see PC World Online (www.pcworld.com/t20pcs).

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17B+	17"/15.7"	1280x1024	Digital On-Screen	.28	$499
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PC WORLD

TOP 20 BUDGET DESKTOPS

	SYSTEMS	Last month	Month tested	Street price (8/15/97)	CPU	Comments
1	Dell Dimension M200a 800/388-8542 www.dell.com	1	June 97	$1799	Pentium MMX-200	Quick, well-rounded, has 56-kbps x2 modem, top reliability and service ratings.
2	Dell Dimension XPS M200s 800/388-8542 www.dell.com	–	NEW	$2199	Pentium MMX-200	More expensive than M200a, but more RAM and storage, bigger monitor.
3	Quantex QP5/200 SM1 MMX 800/896-4898 www.quantex.com	2	Oct 97	$1799	Pentium MMX-200	$50 price trim, fast, full multimedia, K56flex modem, improved reliability rating.
4	Gateway 2000 G5-166 M 800/846-2000 www.gateway.com	3	Aug 97	$1799	Pentium MMX-166	Good multimedia, 56-kbps x2 modem, 17-inch monitor, Canon BJC-240 printer.
5	Dell OptiPlex Gn+233 800/388-8542 www.dell.com	–	NEW	$2169	Pentium MMX-233	Integrated ethernet, best support; no free bays, not as fast as some PMMXs.
6	CyberMax Power Max 800/437-4596 www.cybmax.com	7	Sept 97	$1399	AMD K6-166	$200 price drop on fast, low-cost AMD K6 tower; round-the-clock support.
7	DirectWave MVP VC2Desk233 800/882-8108 www.directwave.com	–	NEW	$2000	Cx6x86MX-PR233	Fast, upgradable, well designed, choice of business suites; unknown reliability.
8	Micro Express MicroFlex-K5/5166 800/989-9900 www.microexpress.net	6	Aug 97	$1269	AMD K5-PR166	Generic system has a lot of RAM for a sub-$1300 PC.
9	USA Flex Performer 800/872-3539 www.usaflex.com	8	Oct 97	$1899	Cx6xB6MX-PR200	Fast Cyrix-based PC drops $100 in price; unknown system reliability record.
10	ProGen Atlas X 200 888/776-9595 www.progen.com	11	Aug 97	$1549	Pentium MMX-200	Fleet-footed, $180 off, speakers with subwoofer; no weekend support.
11	Micro Express MicroFlex-PR/233 800/989-9900 www.microexpress.net	9	Sept 97	$1799	AMD K6-233	233-MHz K6 is third-fastest on chart; good design but no software.
12	Micro Express MicroFlex-686/P200+LC 800/989-9900 www.microexpress.net	15	Aug 97	$1499	Cx6x86-PR200+	$300 price drop on fast Cyrix-based multimedia PC with modem.
13	Quantex QP6/233 SM-3 800/896-4898 www.quantex.com	–	Sept 97	$2499	Pentium II-233	Fast, with software bundle, multimedia, modem. First Pentium II on chart.
14	Kingdom Pinnacle PV-200+ 800/385-3436 www.kingdomcomputers.com	–	NEW	$1297	Cx6x86-PR200+	Low-cost multimedia PC has modem, home software, surge suppressor.
15	Kingdom Pentium MMX 200 Home & Office 800/385-3436 www.kingdomcomputers.com	10	July 97	$1997	Pentium MMX-200	Fast, well designed, with full multimedia, modem, good home-office software.
16	Polywell Poly 500QX 800/999-1278 www.polywell.com	5	June 97	$1395	AMD K5-PR166	Past Best Buy improves graphics card and storage, costs $100 more.
17	Micro Express MicroFlex-MMX/2000 800/989-9900 www.microexpress.net	–	July 97	$1699	Pentium MMX-200	Sharp $300 price drop puts quick PMMX-200 on chart, full multimedia, modem.
18	CyberMax Intel Promax 3 P200 MMX 800/437-4596 www.cybmax.com	14	June 97	$1749	Pentium MMX-200	Fast multimedia PC with modem, round-the-clock support; unknown reliability.
19	Seanix Baby Grand CS 800/252-1190 www.seanix.com	–	NEW	$999	Pentium MMX-166	Supercheap starter PC with sound and modem; monitor is very small.
20	Polywell Poly 5200Mx 800/999-1278 www.polywell.com	18	May 97	$1785	Pentium MMX-200	Fast PC hits the chart with $265 drop; limited data on system reliability.

Best Buy See features chart, page 286; test report, page 290. Recommended as home system

[1] Insufficient data.

THE NON-INTEL CONTINGENT GAINS GROUND on this month's chart: Almost half our budget systems now sport processors from Advanced Micro Devices and Cyrix. But the top five are all Intel, with two new Pentium MMX systems—Dell's Dimension XPS M200s and OptiPlex Gn+233—earning Best Buys. The rest of the chart ranges widely, from the PMMX-166–based $999 Seanix Baby Grand CS to the $2499 Quantex QP6/233 SM-3—the first Pentium II to make our Budget chart. We also looked at budget models from Compaq and Micro Express, but they didn't rank high enough to make our chart. For more on these machines, visit PC World Online (www.pcworld.com/t20pcs).

SCORECARD

★ Overall rating	Price	Vendor's system reliability	Features and design	PC WorldBench score/performance	Vendor's support quality/policies	Reader service number
85	average	best	very good	219/good	best/best	623
83	expensive	best	very good	234/very good	best/best	624
82	average	good	very good	230/very good	good/best	625
82	average	fair	outstanding	213/good	best/best	626
81	average	best	good	233/very good	best/best	627
80	inexpensive	[1]	very good	223/good	[1]/best	628
78	average	[1]	outstanding	254/outstanding	[1]/best	629
78	inexpensive	[1]	very good	208/satisfactory	[1]/best	630
78	average	[1]	outstanding	235/very good	[1]/best	631
77	inexpensive	[1]	very good	232/very good	[1]/fair	632
77	average	[1]	very good	246/outstanding	[1]/best	633
77	inexpensive	[1]	very good	217/good	[1]/best	634
77	expensive	good	good	247/outstanding	good/best	635
76	inexpensive	[1]	very good	207/satisfactory	[1]/good	636
76	average	[1]	outstanding	233/very good	[1]/good	637
76	inexpensive	[1]	good	213/good	[1]/good	638
76	average	[1]	good	233/very good	[1]/best	639
75	average	[1]	very good	229/good	[1]/best	640
75	very inexpensive	[1]	good	200/satisfactory	[1]/poor	641
76	average	[1]	good	234/outstanding	[1]/good	642
Scorecard weightings ▶	Price 25 percent	Reliability 25 percent	Features 20 percent	Performance 15 percent	Support 15 percent	All products: 902

This Month's Best Buys

1 DELL DIMENSION M200A

PRO: Inexpensive for a PMMX-200, excellent support, 56-kbps x2 modem

CON: Monitor supplied with test PC was a bit dull

The Dell Dimension M200a retains its hold on the number one spot this month—despite a challenge from the faster and more upgradable new Dimension XPS M200s at number two. What makes the difference for the M200a is its $1799 price. For $400 less than the M200s, the M200a gives you all the essentials: fine performance, a 12X–24X CD-ROM drive, competent integrated sound and graphics, and a 56-kbps x2 modem. Granted, many other Pentium MMX-200s are faster than the M200a—its 16MB of standard RAM held its speed down a bit: Its PC WorldBench score of 219 in our tests is about 7 percent slower than the 234 posted by its sibling, although the newer Dimension XPS M200s uses the same 200-MHz processor. If you work with more than a couple of programs open at once, spring for the extra $99 or so that it will take to buy the M200a with 32MB of RAM.

Dell Dimension M200a

With its Microsoft Office 97 Small Business Edition software bundle, this minitower is a good, no-nonsense choice for the home or small office. However, we found that the 15-inch LS monitor included with our test unit lacked sharpness; upgrading to the very good 800LS Trinitron monitor costs a mere $49 extra, and the new 1000LS 17-incher costs only $119 more. Note, though, that Dell is now shipping improved versions of the LS monitors. While we haven't seen the 15-incher yet, the 17-inch model improves noticeably on the image quality of its predecessor.

The M200a's clean interior makes the system easy to upgrade. Dell's documentation is well illustrated and indexed, and it has a handy glossary. But more than anything else, it's the company's top support and system reliability ratings (derived from our fax-back polls) that consistently keep Dell systems so high on our charts.

2 DELL DIMENSION XPS M200S

PRO: Fast, expandable, with large hard drive, best reliability and service ratings

CON: Awkward monitor controls

If your budget won't permit you to shop for a Pentium II, you could do a lot worse than the Pentium MMX-200–equipped Dimension XPS M200s. Priced at $2199, it's a nice step up from the less expensive Dimension M200a in first place—and it gives you greater flexibility to upgrade your graphics adapter and sound if your needs change in the future. Unlike the M200a, which uses integrated video and sound, the M200s includes a graphics card and a sound board. But like the number ▶

PHOTOGRAPHS: KEN SMITH

TOP 20 BUDGET DESKTOPS — STANDARD FEATURES

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor tube/ viewable diagonal (inches)	Screen pitch (mm)	CD-ROM drive speed
1	Dell Dimension M200a*	Pentium MMX-200	16	512	2.1	integrated	2/DRAM	15/13.8	.28	12X-24X
2	Dell Dimension XPS M200s*	Pentium MMX-200	32	512	6.4	STB Nitro 3D	4/EDO DRAM	17/15.9	.28	12X-24X
3	Quantex QP5/200 SM1 MMX*	Pentium MMX-200	32	512	3.2	Matrox Mystique 220	4/SGRAM	15/13.9	.28	12X-16X
4	Gateway 2000 G5-166 M*	Pentium MMX-166	16	512	2	integrated	2/EDO DRAM	17/16.1	.28	12X-16X
5	Dell OptiPlex Gn+233*	Pentium MMX-233	32	256	3.2	integrated S3 Trio 64V2	2/VRAM	15/13.8	.25	12X-24X
6	CyberMax Power Max	AMD K6-166	32	512	3.2	Matrox Mystique 220	4/SGRAM	15/13.8	.28	12X-16X
7	DirectWave MVP VC2Desk233	Cx6x86MX-PR233	32	512	6.4	Matrox Millennium	4/WRAM	17/16.1	.26	12X-24X
8	Micro Express MicroFlex-K5/5166	AMD K5-PR166	32	512	2.1	ATI PC2TV	2/WRAM	15/13.8	.28	10X
9	USA Flex Performer	Cx6x86MX-PR200	32	512	4.1	Matrox Millennium	4/WRAM	17/16.1	.28	12X-20X
10	ProGen Atlas X 200	Pentium MMX-200	32	512	3.2	Matrox Millennium	4/WRAM	17/15.8	.26	12X-16X
11	Micro Express MicroFlex-PR/233	AMD K6-233	64	512	2	STB Velocity 3D Video	4/VRAM	17/15.8	.26	12X
12	Micro Express MicroFlex-686/P200+LC	Cx6x86-PR200+	32	512	4	STB Velocity 3D Video	4/VRAM	17/15.8	.28	12X
13	Quantex QP6/233 SM-3	Pentium II-233	32	512	4	Matrox Millennium	4/WRAM	17/16	.25	12X-16X
14	Kingdom Pinnacle PV-200+	Cx6x86-PR200+	16	512	2.6	Hercules Terminator 3D	2/DRAM	15/13.8	.28	12X-24X
15	Kingdom Pentium MMX 200 Home & Office	Pentium MMX-200	32	512	3.2	Hercules Dynamite 128	4/MDRAM	17/15.8	.28	12X-16X
16	Polywell Poly 500QX	AMD K5-PR166	32	512	4.1	Diamond Stealth 3D 2000	4/EDO DRAM	15/13.8	.28	12X-16X
17	Micro Express MicroFlex-MMX/2000	Pentium MMX-200	32	512	5	STB Velocity 3D	4/VRAM	17/15.8	.26	10X
18	CyberMax Intel Promax 3 P200 MMX	Pentium MMX-200	32	512	3.2	Diamond Stealth 3D 2000	4/EDO DRAM	17/15.8	.28	12X
19	Seanix Baby Grand CS	Pentium MMX-166	16	512	1.6	S3 Trio/Vision 2	1/DRAM	14/13.2	.28	12X-16X
20	Polywell Poly 5200Mx	Pentium MMX-200	32	512	2.1	Diamond Stealth 3D 200D	4/EDO DRAM	17/15.8	.28	8X

* Best Buy [1] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology. [2] Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

one M200a, it comes with Dell's top-rated system reliability and support.

When it comes to speed, the XPS M200s gets more from its 200-MHz CPU than the M200a does: Its PC WorldBench score of 234 is 7 percent faster than the M200a's 219. And it offers other perks to lessen the sting of its $400-higher price. For one, it has twice the memory; you'll appreciate the added speed of the 32MB of SDRAM when running multiple programs. The M200s also gives you three times as much storage, with a healthy 6.4GB hard drive. Its 4MB STB Nitro 3D graphics card lets you display more colors at higher resolutions than the M200a's integrated 2MB graphics adapter. The importance of the added graphics memory can't be discounted: When using a larger monitor, you're likely to increase the resolution to obtain smoother image quality and to display more information at once. The Dimension XPS M200s's basic 17-inch monitor gives you a lot more viewing area than the 15-inch model that comes with the less expensive configuration of the M200a that tops our chart.

Dell Dimension XPS M200s

The XPS M200s includes Dell's basic Altec Lansing ACS 90 speakers. While these units cost about $75 less than the ACS 290s that Dell also offers, we preferred the sound of the lower-price models. The system's software bundle is generous, providing Office 97 Small Business Edition and either Encarta 97 or Microsoft Bookshelf. The M200s packs the same great 3Com/U.S. Robotics 56-kbps x2 Sportster internal modem, 12X–24X NEC CD-ROM drive, spacious minitower case, and excellent expandability as our number one power desktop. However, to keep costs down, the M200s eschews some of the latest bells and whistles—such as Accelerated Graphics Port video—that you'll find in the newer Pentium II PCs.

Actually, the only fault we could find with this machine concerns its monitor controls, which could be much easier to use. Fortunately, after you figure out how to adjust the display, you'll find its image quality fairly good. All in all, the XPS M200s is a welcome addition to our chart.

		EXPANDABILITY						CUSTOMER SUPPORT			
Modem speed (kbps)	Sound board	Case style	Max. RAM (MB)	Maximum secondary cache (K)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
56 [1]	integrated Sound Blaster 16	minitower	64	512	1	3/1	6	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	integrated	minitower	64	512	1	3/1	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [2]	Ensoniq Audio S5016	minitower	256	512	4	3/2	5	3/1	24	Sat., Sun.	BBS, WWW
56 [1]	integrated	minitower	128	512	1	3/2	5	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
–	integrated Vibra 16	desktop	256	512	1	0/0	3	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	Ensoniq Audio PCI Wavetable	tower	384	512	5	3/2	5	3/1	24	Sat., Sun.	BBS, WWW
56 [2]	Sound Blaster 32 PnP	minitower	256	512	2	4/0	4	3/3	24	Sat.	BBS, WWW
33.6	Superior Sound32	minitower	128	512	4	3/2	3	4/4	24	Sat., Sun.	WWW
56 [1]	Ensoniq Audio PCI 9718	minitower	256	512	4	3/1	3	3/3	24	Sat., Sun.	BBS, WWW
33.6	Progen AWE32 PnP 3D	minitower	256	512	4	3/1	4	3/1	9	–	BBS, WWW
33.6	Ensoniq Audio PCI Wavetable	tower	256	512	1	3/0	3	4/4	24	Sat., Sun.	WWW
33.6	Sound Blaster AWE64	minitower	512	512	2	2/3	3	4/4	24	Sat., Sun.	WWW
33.6	integrated Yamaha OPL3-Sax	tower	128	512	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
33.6	Ensoniq Audio PCI Wavetable	minitower	256	512	4	2/3	4	3/1	13	Sat.	WWW
33.6	Schubert 3D	minitower	128	512	3	3/3	4	3/1	13	Sat.	WWW
33.6	Supersound Origins 3D	minitower	128	512	4	3/0	4	3/5	24	Sat., Sun.	BBS, WWW
33.6	Sound Blaster 32 IDE PnP	minitower	192	512	4	3/0	2	4/4	24	Sat., Sun.	WWW
33.6	Ensoniq Soundscape Vivo	minitower	128	512	0	3/2	4	3/1	24	Sat., Sun.	BBS, WWW
33.6	Ensoniq Audio ES1868 PCI	minitower	128	512	2	3/1	3	varies [3]	9	–	–
33.6	Sound Blaster 16 IDE PnP	minitower	128	512	5	3/0	5	3/5	24	Sat., Sun.	BBS, WWW

[3] Five years on motherboard, memory, video, and CPU; three years on other parts.

3 QUANTEX QP5/200 SM1 MMX

PRO: Fast, affordable

CON: Slight cable clutter

Quantex's QP5/200 SM1 MMX delivers better-than-average Pentium MMX-200 performance, scoring a commendable 230 on our PC WorldBench test suite. Priced $50 cheaper at just $1799 this month, this multimedia minitower made a strong repeat play for number two Best Buy. But ultimately, the slightly faster and more powerfully configured Dell Dimension XPS M200s prevailed, mainly because of its higher system reliability rating.

The QP5/200 SM1 MMX comes with the impressive Matrox Mystique 220 video adapter with 4MB of fast SGRAM. You also get Matrox's Rainbow Runner video capture software and TV Tuner module. The 15-inch MAG InnoVision monitor provides good image quality and easy-to-use controls. Audio is capably handled by a 16-bit Ensoniq sound card and a pair of Altec Lansing ACS 45 speakers.

As with other Quantex systems we've seen, the QP5/200's case is sturdy and the interior is designed for expandability. Our test unit had plenty of space to add RAM, expansion cards, and drives. Our only complaint was with the few stray cables left hanging.

The software bundle is better than you get with most systems, including Microsoft Office 97 Small Business Edition and a nice selection of games—among them Demolition Derby, a car-racing CD-ROM title. The QP5/200's 56-kbps fax-modem, which uses the K56flex protocol from Rockwell-Lucent, offers the potential for swift Internet downloads.

Quantex produced a good manual with serviceable illustrations. Technical support is available toll-free around the clock; our anonymous calls got responses within 5 minutes and revealed a friendly and patient tech support staff. The warranty covers parts for three years and labor for one. The current collection of responses from our fax-back survey gives Quantex a rating of good for system reliability—up from last month's fair—and good for support quality. ▶

Quantex QP5/200 SM1 MMX

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visioneer

Circle 187 on reader service card

4 GATEWAY 2000 G5-166 M

PRO: Excellent internal design, good software, includes free printer

CON: System reliability rated only fair

Gateway 2000's G5-166 M has been a Budget Desktops Best Buy since August. This month it gets some added shine, thanks to the inclusion of a larger 2GB hard drive and a bundled Canon BJC-240 color BubbleJet printer—all for $1799, $100 less than last month. The BJC-240 is a basic printer that requires you to swap cartridges if you want to print a true black monochrome, however.

Gateway 2000 G5-166 M

Although the G5-166 M has more-than-adequate performance, its PC WorldBench score of 213 is the lowest found among this month's Best Buys. If you plan to keep multiple programs open at once, you'll get better performance if you spend an extra $88 to double the system's RAM to 32MB. This starter PC is priced with a CrystalScan 17-inch monitor—it's not Gateway's best, but it's good enough for most business and home applications. The G5-166 M also has 2MB of integrated video RAM, 16-bit integrated wavetable sound, and a 12X–16X CD- ▶

TOP 20 BUDGET DESKTOPS — TEST REPORT

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	PC WorldBench score
1	Dell Dimension M200a*	Pentium MMX-200	16	512	219
2	Dell Dimension XPS M200s*	Pentium MMX-200	32	512	234
3	Quantex QP5/200 SM1 MMX*	Pentium MMX-200	32	512	230
4	Gateway 2000 G5-166 M*	Pentium MMX-166	16	512	213
5	Dell OptiPlex Gn+233*	Pentium MMX-233	32	256	233
6	CyberMax Power Max	AMD K6-166	32	512	223
7	DirectWave MVP VC2Desk233	Cx6xB6MX-PR233	32	512	254
8	Micro Express MicroFlex-K5/5166	AMD K5-PR166	32	512	208
9	USA Flex Performer	Cx6x86MX-PR200	32	512	235
10	ProGen Atlas X 200	Pentium MMX-200	32	512	232
11	Micro Express MicroFlex-PR/233	AMD K6-233	64	512	246
12	Micro Express MicroFlex-686/P200+LC	Cx6xB6-PR200+	32	512	217
13	Quantex QP6/233 SM-3	Pentium II-233	32	512	247
14	Kingdom Pinnacle PV-200+	Cx6x86-PR200+	16	512	207
15	Kingdom Pentium MMX 200 Home & Office	Pentium MMX-200	32	512	233
16	Polywell Poly 500QX	AMD K5-PR166	32	512	213
17	Micro Express MicroFlex-MMX/2000	Pentium MMX-200	32	512	233
18	CyberMax Intel Promax 3 P200 MMX	Pentium MMX-200	32	512	229
19	Seanix Baby Grand CS	Pentium MMX-166	16	512	200
20	Polywell Poly 5200Mx	Pentium MMX-200	32	512	234

*Best Buy

Word 7.0 for Windows 95 · Picture Publisher 6.0 for Windows 95 · WordPerfect 6.1 for Windows · Excel 7.0 for Windows 95 · Paradox 5.0 for Windows · 1-2-3 release 5 for Windows

HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

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Breakthrough Price

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Circle 247 on reader service card

ROM drive. The Telepath 56-kbps modem conforms to the U.S. Robotics x2 protocol, and Gateway throws in a pair of Altec Lansing ACS 41 speakers.

The good-looking minitower case is secured by thumbscrews for easy access. If you need to upgrade the G5-166 M, you'll appreciate its clean, well-organized interior. Plenty of slots and storage bays are available for expansion. One of the system's strongest points—aside from the free printer—is the software that comes with it: You get Microsoft Office 97 Small Business Edition; Encarta; and Street Plus, which helps you locate any address in the United States.

Our readers rate Gateway 2000's system reliability as only fair but hail its support as among the best.

5 DELL OPTIPLEX GN+233

PRO: Fast, with removable expansion slot chassis, integrated ethernet adapter

CON: No open drive bays

The OptiPlex Gn+233 does a fine job of representing the low end of Dell's OptiPlex line. Priced at just $2169, this corporate system is quick enough to handle all the spreadsheets and word processing files most office workers are likely to throw at it. Meanwhile, the system administrator can take comfort in knowing that this handsome little desktop PC is designed to plug right in to the company network, thanks to its integrated ethernet adapter. The corporate buyers who purchase OptiPlex PCs aren't interested in getting the nth degree of system performance if it entails added cost or compatibility problems. While its PC WorldBench score of 233 is actually a point lower than that of the PMMX-200–based Dimension XPS M200s at number two, this Pentium MMX-233 is still a very fast performer.

As with all its OptiPlexes, Dell puts the new Gn+233 through more hoops when testing for network hardware and software compatibility than it does with its Dimension line. This system is quite well equipped, including 32MB of RAM, a 3.2GB hard drive with bus-master IDE adapter, an NEC 12X–24X CD-ROM drive, and integrated 16-bit sound. Even the 15-inch Trinitron display is a cut above average: The Dell 800HS consistently rates well in our monitor tests, with easy-to-use controls and a sharp image. And although the Gn+233's basic Altec Lansing ACS 90 speakers list for $75 less than the ACS 290 set bundled with its higher-price sibling (the OptiPlex GXa-266), we actually like the cheaper speakers better.

Dell OptiPlex Gn+233

As with its pricier stablemate, the Gn+233 lets you slide out the circuit board that holds all its expansion slots with the pull of a lever. Reversing the process and reinstalling all the slots at once is just as easy.

The Gn+233 isn't perfect, however. Although three expansion slots are available, the system lacks drive expandability: The somewhat flimsy-feeling desktop case comes with all its storage bays already full.

But Dell's documentation, tech support, and warranty are among the best in the business, which makes the OptiPlex Gn+233 even more attractive.

New This Month

The following PCs made our Budget Desktops chart for the first time this month. For brief reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

7 DIRECTWAVE MVP VC2DESK233

PRO: Fast, with big hard drive, great speakers

CON: Unknown system reliability

If you work mostly with business applications and are looking for a powerful alternative to "Intel Inside," the DirectWave MVP VC2Desk 233 deserves consideration. This system is built around a Cyrix Cx6x86MX-PR233 CPU, and when it comes to business apps, the VC2Desk 233 kicks butt. Its scorching PC WorldBench score of 254 makes it the fastest of our Top 20 budget desktops, surpassing even the Quantex Pentium II-233 that made our chart this month. And the configuration that we tested goes for a mere $2000, so you get a lot for your money. (If you need the extra capability, another $199 will buy you an upgraded sound system, including the excellent Sound Blaster AWE64 card.)

MVP VC2Desk233

The MVP that we reviewed provides a no-compromise configuration: The 6.4GB hard drive should give you plenty of storage, and the 12X–24X CD-ROM drive, Shark 56-kbps modem with K56flex technology, and good-quality Sound Blaster 32 PnP audio equal or surpass what you usually get with a budget machine. Moreover, this PC comes with one of the best-sounding speaker sets we've auditioned—an Arkins Acoustix system that doesn't need a subwoofer to deliver terrific bass. DirectWave even bundles Corel's WordPerfect 8 business suite; in addition to WordPerfect, it includes Quattro Pro, Corel Presentations, and the CorelCentral personal information manager. Unlike most companies, DirectWave offers you a wide choice of bundled software: If you don't want Corel's package, DirectWave can substitute Lotus SmartSuite for about the same system price, or you can choose Microsoft Office 97 Professional for about $150 more.

The MVP's graphics subsystem is better than average: The 4MB Matrox Millennium card matches up very well with the 17-inch MAG InnoVision DJ 700 monitor. The latter's graphics are a cut above the norm, and although its text could be sharper, the overall image quality is fairly good. Where the display really shines is in its controls: The unique one-knob dial is one of the easiest to use that we've seen—press the knob to call up the menu, twirl the knob and click to select the control, and then adjust with the dial.

DirectWave's system is very easy to work on: The spacious minitower case has plenty of room for future expansion, with four available drive bays and four open slots. The documentation is a bit on the techie side, however, and there's no Sunday tech support. But the trade-off is a better-than-usual warranty that covers labor as well as parts for three years. ▶

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*See store for mail-in rebate details

14 KINGDOM PINNACLE PV-200+

PRO: Inexpensive, home software bundle, surge suppressor, clean design is easy to work on

CON: Fairly flimsy keyboard and sound system

It's surprising how much computer $1297 can buy these days. The Kingdom Pinnacle PV-200+ is a likeable home system that has everything you need to get started—including a basic bundle of home software, multimedia peripherals, and a 33.6-kbps modem. As you might expect with a system this inexpensive, the Pinnacle won't set any speed records: With its Cyrix Cx6x86-PR200+ processor and 16MB of RAM, it produced a PC WorldBench score of 207. While that's not bad for such a low-price PC, if you plan to work with multiple applications open at once, spend the extra $85 or so to have Kingdom outfit your system with 32MB: You'll cut the time you spend staring at the hourglass *way* down.

Kingdom Pinnacle PV-200+

The Pinnacle's minitower case is built for stability: It's an inch or so wider than usual and has rubber feet to help keep it stationary. You can remove the side panel easily by taking out two screws from the back—no sticking or binding as with many so-called easy-off covers we've wrestled with. Inside, the system is spacious, and all the components are very accessible. We appreciated having plenty of room at the inside end of the drive bays to maneuver drives and plug in cables. You're unlikely to run out of places to add drives; five empty bays are available, and two can accept a removable-media device such as a tape backup or a Jaz or Zip drive. There's also plenty of space to add RAM and expansion cards.

Even the video subsystem is fairly good: The 2MB Hercules Terminator 3D graphics card is paired with a good-looking Kingdom 50i 15-inch monitor. And the company throws in other perks to differentiate this system from the average bargain box: For example, the TrippLite Super 7 surge suppressor can protect your fax-modem line from lightning strikes as well as ensure that the rest of your PC won't get fried by a catastrophic electrical surge. The software bundle includes Compton's Interactive World Atlas and Encyclopedia, Home Library, and Genius of Edison, along with Microsoft's Works and Money.

Some of the other components are cheesy: We've bought microwave meals in trays heavier than Kingdom's keyboard, and the MLi 170 speakers are fit more for business audio than home listening. The very capable Ensoniq wavetable 3D sound card deserves better speakers.

Although we haven't received enough fax-back responses from Kingdom customers to judge the company's system reliability and service, Kingdom's policies are competitive: The company offers a three-year warranty on parts, with a year of free labor. Toll-free tech support is available 13 hours each weekday and 8.5 hours on Saturday.

19 SEANIX BABY GRAND CS

PRO: Terrifically low price for a complete multimedia PC with modem

CON: Cheap-feeling keyboard, flimsy case, no weekend technical support

Would you believe you can get a complete multimedia Pentium MMX-166 PC with a 33.6-kbps modem for just $999? Amazing but true—and yes, this system price includes a monitor. The Seanix Baby Grand CS delivers a lot for the money—but don't expect the quality of this minitower to match that of systems ranking higher on our chart. And the uneven support package may turn off many first-time users—some of the PC's most likely buyers.

Seanix Baby Grand CS

Great as this low price sounds, you won't find any $999 systems on the market that don't cut corners somewhere. For example, the monitor that comes with the Seanix Baby Grand is just a 14-incher—a size that's seen only rarely on our charts these days. But it *is* a monitor, and its display is reasonably crisp.

The Seanix's performance is also nothing to write home about: With 16MB of RAM, it runs more like a standard P-166 than an MMX. Its PC WorldBench tally of 200 is the lowest on our Budget chart.

The minimalist approach extends to the graphics card, a 1MB S3 Trio/Vision 2 adapter, and continues through the 1.6GB hard drive. The 8X CD-ROM drive that came with our review unit has since been replaced with a 12X–16X offering at the same price—a welcome upgrade. You get basic 16-bit sound, Altec Lansing ACS 45 speakers, and a 33.6-kbps fax-modem.

The system is assembled well, although the cables could have been tied off more neatly inside the case. There's also a considerable amount of flex to the case when the cover is off. Expandability is better than you would expect of a system with the "Baby" designation: You get three open expansion slots and four available drive bays. The system lives up to its Baby billing inside the case, however, where the quarters are *very* close.

The Baby Grand's keyboard suffers from the ultrabudget philosophy. It's so lightweight we worried that a stray draft from an open window might blow it off the table, and its keystrokes have a muddy feel. The Microsoft IntelliMouse, on the other hand, is one of the better mice we've used; it includes a handy scrolling wheel between the buttons that works with all Microsoft Office 97 applications.

The documentation for the Baby Grand is good, and Seanix has integrated it all into a short but informative user guide. But the rest of the company's support for this system is as lean as the price. Toll-free technical support is available only 9 hours per weekday, and nobody is around to answer your questions on weekends. Without any Web or BBS support, you'll find it hard to get driver and BIOS updates. The warranty is good, if somewhat confusing, varying from three to five years depending on the component. ▶

Beyond the Top 20

We evaluated these systems along with the others, but they didn't score high enough to reach the Top 20 Budget Desktops chart. For write-ups, see PC World Online (www.pcworld.com/t20pcs).

- **Compaq Deskpro 2000 5200X/3200/CDS**
- **Micro Express MicroFlex-F233J**

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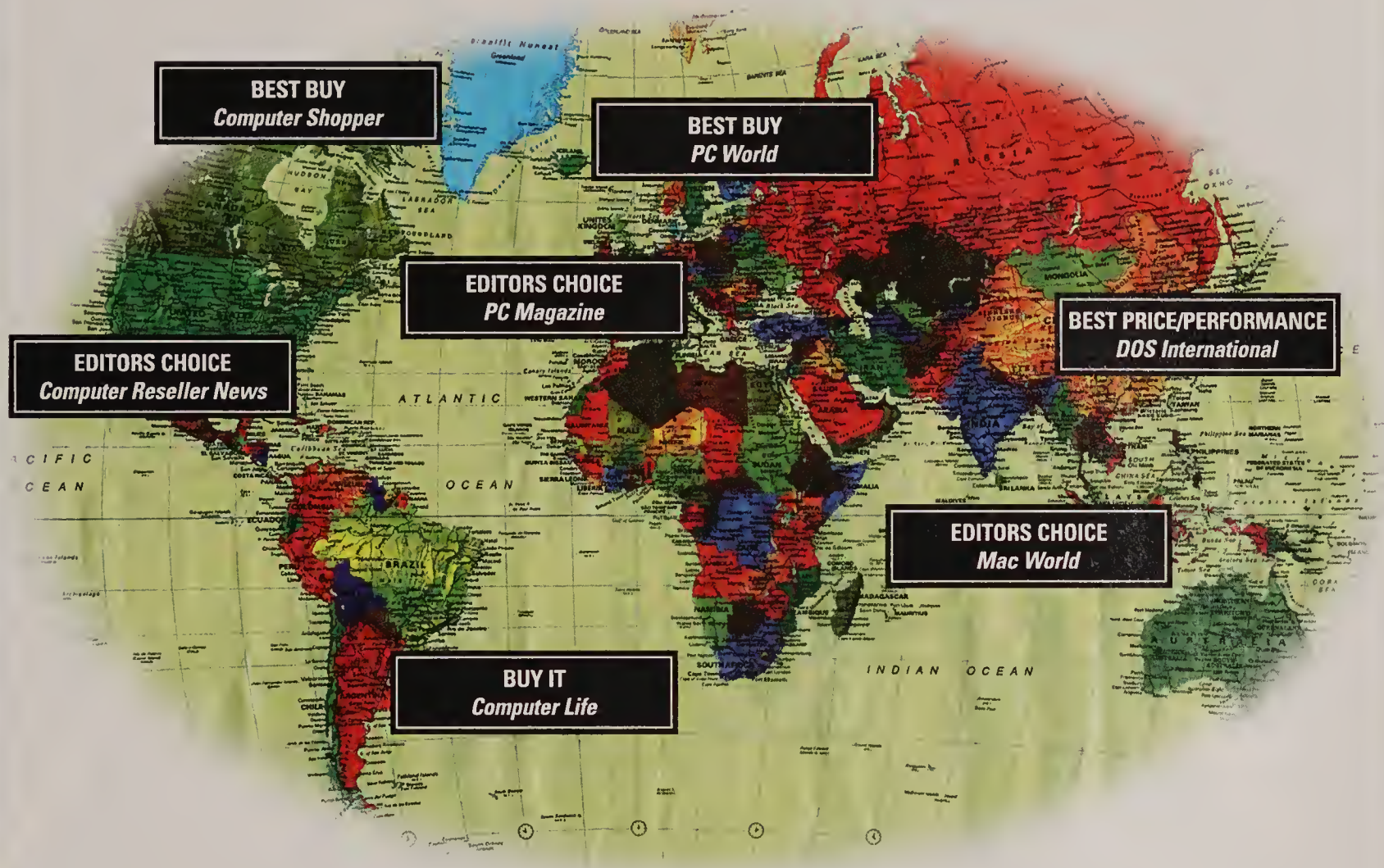

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Model/ Viewable Area	Dot Pitch Horiz. Scan	Max. Horiz. Scan Rate	Refresh Rate	ESP
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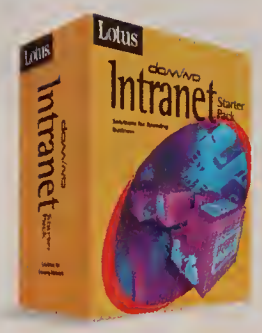

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PC WORLD

TOP 20 NOTEBOOK PCs

	POWER NOTEBOOKS	Last month	Month tested	Street price (8/15/97)	CPU	Comments
1	WinBook FX 800/965-9349 www.winbook.com	1	Sept 97	$3999	Pentium MMX-166	Very fast multimedia notebook has 48MB of RAM and a true-color screen.
2	Gateway 2000 Solo 9100 800/846-2000 www.gateway.com	–	NEW	$4899	Pentium MMX-233	First Tillamook notebook has record-setting speed, big screen; pricey.
3	Dell Latitude LM M166ST 800/388-8542 www.dell.com	4	June 97	$3549	Pentium MMX-166	$350 price drop on speedy notebook, nearly 6-hour battery; no modem.
4	Micron Transport XKE P166 A 800/393-8935 www.micronpc.com	3	Sept 97	$5149	Pentium MMX-166	Very fast, fully loaded, more than 6-hour battery, fast CD-ROM drive; pricey.
5	Gateway 2000 Solo 2200 800/846-2000 www.gateway.com	8	May 97	$3794	Pentium MMX-166	$195 price cut on speedy desktop replacement, more portable than Solo 9100.
6	Transmonde Vibrant 166Tmx 888/988-2882 www.transmonde.com	6	Sept 97	$3899	Pentium MMX-166	Sturdy but heavy notebook really flies; support policies are thin.
7	Sony PCG-707C 800/476-6972 www.sony.com	–	NEW	$4500	Pentium MMX-166	Sony first-timer has winning speed, design, screen; battery could be better.
8	Gateway 2000 Solo 2100 800/846-2000 www.gateway.com	9	Apr 97	$3279	Pentium MMX-150	Nimble PMMX-150 is $120 more affordable this month.
9	Dell Latitude XPi CD M166ST 800/388-8542 www.dell.com	–	July 97	$4349	Pentium MMX-166	$470 price drop puts corporate-style desktop replacement back on chart.
10	Compaq Presario 1080 800/345-1518 www.compaq.com	–	June 97	$3699	Pentium MMX-166	Sleek portable with good sound and fine battery life is now $500 less.
	BUDGET NOTEBOOKS					
1	CTX EzBook 750MS 800/888-9052 www.ctxintl.com	1	Aug 97	$1749	Pentium MMX-150	Fastest budget notebook, knockout price, good battery; weak support policies.
2	Gateway 2000 Solo 2300 800/846-2000 www.gateway.com	–	NEW	$2699	Pentium-133	Impressive speed from standard Pentium, longest battery life here, modem.
3	CTX EzBook 730 CDT 800/888-9052 www.ctxintl.com	–	June 97	$1799	Pentium-133	Low-cost PC now $100 less, active-matrix screen, above-average battery.
4	Fujitsu LifeBook 435Dx 888/466-8434 www.fujitsu-pc.com	9	Oct 97	$1799	Pentium MMX-133	$200 price drop on affordable, snappy PMMX-133; so-so screen.
5	Fujitsu LifeBook 420D 888/466-8434 www.fujitsu-pc.com	4	Sept 97	$1599	Pentium-120	Cheap notebook has great battery and ergonomics; slowest on chart.
6	WinBook XP5 Pro P150 800/965-9349 www.winbook.com	5	June 97	$2599	Pentium-150	Fast, with modem, vivid active-matrix screen; support policies are not great.
7	AMS TravelPro 105CS 800/886-2671 www.amstech.com	6	Sept 97	$1995	Pentium-150	Good performer, long warranty; display could be crisper.
8	Toshiba Satellite 225CDS 800/334-3445 www.computers.toshiba.com	–	NEW	$1999	Pentium-133	Well designed, with good keyboard; tech support is free for only one year.
9	AcerNote Light 382 800/733-2237 www.acer.com/aac/	10	July 97	$1799	Pentium-150	Light and snappy, fine battery; below-average system reliability rating.
10	Digital HiNote VP 560 800/664-3333 www.digital.com	–	Sept 97	$2199	Pentium-133	Fine design, well built, very good battery; free tech support for only one year.

Best Buy See features chart, page 300; test report, page 304.

[1] Includes computer, adapter, power cord, and floppy drive or CD-ROM drive. [2] Insufficient data.

INTEL'S "TILLAMOOK" PROCESSOR arrives this month in the Gateway 2000 Solo 9100—a luxury notebook with record-setting speed. Not to be left out, Sony hits the power chart with its first notebook—a fast, light, and pricey PMMX-166. Another first: The power chart is now all-MMX. Last month's budget number two, the Compaq Armada 1520DM, has been discontinued; its spot goes to the new Gateway Solo 2300. We also reviewed HP's OmniBook 2000CS and Fujitsu's LifeBook 6000, neither of which made our chart. For more on these runners-up, visit PC World Online (www.pcworld.com/t20pcs).

SCORECARD

★ Overall rating	PC WorldBench score/ performance	Price	Vendor's system reliability	Features and design	Vendor's support quality/policies	Battery life (hours:min)/ rating	Traveling weight [1]	Reader service number
87	218/very good	average	average	outstanding	average/poor	4:26/good	average	643
86	242/very good	expensive	average	outstanding	average/fair	4:43/good	heavy	644
86	212/very good	inexpensive	average	very good	average/fair	5:52/very good	average	645
85	221/very good	very expensive	above average	very good	[2]/fair	6:17/outstanding	heavy	646
84	218/very good	average	average	very good	average/fair	3:46/good	average	647
84	218/very good	average	[2]	outstanding	[2]/poor	4:08/good	average	648
84	212/very good	expensive	[2]	very good	[2]/fair	2:40/satisfactory	light	649
83	200/good	inexpensive	average	outstanding	average/fair	3:12/good	average	650
83	199/good	average	average	outstanding	average/good	4:35/good	heavy	651
83	197/good	average	average	good	above average/fair	5:02/very good	heavy	652
Power scorecard weightings ▶	Performance 22 percent	Price 14 percent	Reliability 22 percent	Features 16 percent	Support 10 percent	Battery life 8 percent	Weight 8 percent	
82	198/outstanding	average	[2]	satisfactory	[2]/poor	4:21/good	average	653
81	196/outstanding	expensive	average	very good	average/fair	7:32/outstanding	average	654
80	172/very good	average	[2]	good	[2]/poor	4:41/good	average	655
80	192/outstanding	average	[2]	satisfactory	[2]/fair	3:42/good	average	656
79	145/good	inexpensive	[2]	satisfactory	[2]/fair	4:50/very good	average	657
79	183/very good	expensive	average	very good	average/poor	3:24/good	average	658
79	169/very good	average	[2]	good	[2]/fair	3:44/good	average	659
79	165/very good	average	average	good	below average/fair	3:19/good	average	660
78	170/very good	average	below average	good	[2]/fair	6:45/outstanding	average	661
77	150/good	average	[2]	good	[2]/worst	5:09/very good	average	662
Budget scorecard weightings ▶	Performance 14 percent	Price 22 percent	Reliability 22 percent	Features 16 percent	Support 10 percent	Battery life 8 percent	Weight 8 percent	All products: 903

POWER NOTEBOOKS

This Month's Best Buys

1 WINBOOK FX

PRO: Fast, great screen, good documentation

CON: Problems with the pointing device

You want speed, you crave power, but you can't imagine dropping $5000 for something you stuff into an airplane's overhead bin. Well, check out the WinBook FX, a fast, fully loaded multimedia notebook with a PC WorldBench score of 218 and an impressively low price. While our chart shows the $3999 price the WinBook FX was selling for on our verification date, at press time the company announced a further reduction to $3399.

WinBook FX

The WinBook FX is sturdy, with its brilliant 12.1-inch active-matrix screen protected by a strong casing. The keyboard is comfortable and easy to use. But the eraserhead pointing device on our test notebook gave us problems, ▶

PHOTOGRAPHS: KEN SMITH

TOP 20 NOTEBOOK PCs — STANDARD FEATURES

	POWER NOTEBOOKS	CPU	Traveling weight (pounds)[1]	RAM (MB)	Hard drive (GB)	Color screen type	Screen diagonal (inches)	Screen resolution	Maximum screen colors	Battery type	Pointing device
1	WinBook FX*	Pentium MMX-166	8.4	48	3	active	12.1	800 x 600	16.8 million	lithium ion	eraserhead
2	Gateway 2000 Solo 9100*	Pentium MMX-233	9.2	32	3.1	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
3	Dell Latitude LM M166ST	Pentium MMX-166	7.8	40	2.2	active	12.1	800 x 600	65,536	lithium ion	touchpad
4	Micron Transport XKE P166 A	Pentium MMX-166	9.2	32	3.1	active	13.3	1024 x 768	65,536	lithium ion	touchpad, eraserhead
5	Gateway 2000 Solo 2200	Pentium MMX-166	7.8	40	2.2	active	12.1	800 x 600	65,536	lithium ion	touchpad
6	Transmonde Vibrant 166Tmx	Pentium MMX-166	8.2	48	3.1	active	12.1	800 x 600	65,536	NiMH	touchpad
7	Sony PCG-707C	Pentium MMX-166	6.4	32	2.1	active	12.1	1024 x 768	16.8 million	lithium ion	touchpad
8	Gateway 2000 Solo 2100	Pentium MMX-150	7.8	40	1.3	active	12.1	800 x 600	65,536	lithium ion	touchpad
9	Dell Latitude XPi CD M166ST	Pentium MMX-166	8.8	32	2.2	active	12.1	800 x 600	65,536	lithium ion	trackball
10	Compaq Presario 1080	Pentium MMX-166	8.8	16	1.4	active	12.1	800 x 600	65,536	lithium ion	touchpad
	BUDGET NOTEBOOKS										
1	CTX EzBook 750MS*	Pentium MMX-150	7.8	16	1.4	dual-scan	12.1	800 x 600	65,536	NiMH	touchpad
2	Gateway 2000 Solo 2300*	Pentium-133	7.8	32	2.1	dual-scan	12.1	800 x 600	65,536	lithium ion	touchpad
3	CTX EzBook 730 CDT	Pentium-133	8.2	16	1	active	12.1	800 x 600	16.8 million	NiMH	touchpad
4	Fujitsu LifeBook 435Dx	Pentium MMX-133	8.4	16	1.3	dual-scan	12.1	800 x 600	256	NiMH	touchpad
5	Fujitsu LifeBook 420D	Pentium-120	8.2	16	1	dual-scan	11.3	800 x 600	256	NiMH	touchpad
6	WinBook XP5 Pro P150	Pentium-150	7.4	16	1.1	active	11.3	800 x 600	256	lithium ion	eraserhead
7	AMS TravelPro 105CS	Pentium-150	8.4	16	1.3	dual-scan	12.1	800 x 600	256	NiMH	touchpad
8	Toshiba Satellite 225CDS	Pentium-133	7.8	16	1.3	dual-scan	12.1	800 x 600	16.8 million	lithium ion	eraserhead
9	AcerNote Light 382	Pentium-150	7.6	16	1.4	dual-scan	11.3	800 x 600	256	NiMH	touchpad
10	Digital HiNote VP 560	Pentium-133	8	16	1.4	dual-scan	12.1	800 x 600	65,536	NiMH	touchpad

*Best Buy ● Yes ○ No [1] Includes computer, adapter, power cord, and floppy drive or CD-ROM drive. [2] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.

coming apart in use. The flaw was probably an aberration, but we advise buyers to try the pointing device before purchasing.

Otherwise, the WinBook is impressive, with an ample 48MB of EDO DRAM, a good-size 3GB hard drive, a 10X CD-ROM drive, and a 33.6-kbps modem.

At 8.4 pounds the WinBook FX is average in weight. The battery held up for about 4.5 hours in our test. The FX's manuals are good, and the one-year warranty is typical of the industry, but WinBook skimps on support. There's no tech support nights or Sundays and no repair turnaround policy. Readers responding to our fax-back poll rate WinBook's system reliability and support quality as average.

2 GATEWAY 2000 SOLO 9100

PRO: Fast; big, beautiful active-matrix display; combo CD-ROM/floppy drive

CON: Expensive, heavy

The Solo 9100 is close to being a perfect power notebook. It's the first we've reviewed that uses the new Pentium MMX-233 processor (codenamed Tillamook)—Intel's next-generation notebook CPU. This chip is built to run at breakneck speeds while keeping cool and conserving power. The Solo 9100 produced a heady PC WorldBench score of 242—easily the fastest of any notebook we've benchmarked for our Top 20. And the battery life of about 4.7 hours is more than acceptable. If you can afford the stratospheric $4899 price, you'll walk away with one of the most impressive notebooks we've ever used.

Gateway 2000 Solo 9100

The huge active-matrix screen is so pretty you may never bother connecting an external monitor: This 13.3-inch screen is comparable to a flat-panel display—it runs at 1024 by 768 resolution with 16.8 million colors. Another commendable design feature: The 12X–20X Toshiba CD-ROM drive and floppy drive are integrated into one unit, so there's no more swapping them. If you

		EXPANDABILITY					CUSTOMER SUPPORT			
CD-ROM drive speed	Modem speed (kbps)	Maximum RAM (MB)	Modular expansion bays	Bay for second battery	Optional docking station	Infrared port	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
10X	33.6	80	1	●	●	●	1/1	13	Sat.	BBS, WWW
12X-20X	56 [2]	192	2	●	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
10X	–	72	1	●	○	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
12X-20X	33.6	128	2	●	○	●	3/1	24	Sat., Sun.	CIS, WWW
10X	33.6	80	0	●	○	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
8X	33.6	64	0	●	●	●	1/1	11	–	WWW
8X-14X	33.6	128	0	●	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
10X	33.6	40	1	●	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
10X	33.6	80	0	○	○	●	3/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
10X	33.6	48	0	○	○	○	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
6X	–	72	2	●	●	●	1/1	9	–	WWW
10X	56 [2]	192	2	○	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
6X	–	72	2	●	●	●	1/1	9	–	WWW
10X	–	80	1	●	●	●	1/1	24	Sat., Sun.	WWW
10X	–	72	1	○	●	●	1/1	24	Sat., Sun.	WWW
8X	28.8	40	1	●	●	●	1/1	13	Sat.	BBS, WWW
10X	33.6	80	1	●	●	●	3/3	11	–	BBS, CIS, WWW
10X	–	144	1	●	●	●	1/1	24 [3]	Sat., Sun.	BBS, CIS, WWW
10X	–	64	0	○	○	○	1/1	24	Sat., Sun.	BBS, WWW
12X	–	80	1	●	●	●	1/1	12	–	AOL, BBS, CIS, WWW

[3] First year.

like, however, you can swap the drive unit for a second battery, which should let you cut the AC umbilical for over 9 hours.

The keyboard is a nice size, with surprisingly good touch. The big 3.1GB hard drive is removable. You also get a 56-kbps x2 PC Card modem from 3Com/U.S. Robotics, plus a Yamaha sound system with built-in stereo speakers and a mike.

We did say "close to perfect," and we have a couple of complaints: At 9.2 pounds, the Solo 9100 is one of the two heaviest notebooks on our Top 20 chart.

Gateway 2000's toll-free tech line is available around the clock; our readers rate the quality of Gateway's notebook support as average.

New This Month

The following PC made our Power Notebooks chart for the first time this month. For original reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

7 SONY PCG-707C

PRO: Great screen, light, sturdy construction

CON: Expensive

Sony is the new kid on the block in the notebook marketplace—and if the Pentium MMX-166–based PCG-707C is any indication, the company's portables should find immediate acceptance. This stylish notebook is fast—with a very good PC WorldBench score of 212. It has a great-looking screen and a nice software bundle. So what keeps this system from hitting the top of the chart? A 2.7-hour battery life and a high $4500 price.

Although you may not associate Sony with notebooks, the company has manufactured very good portables for other vendors, including the Latitude XPi made to Dell's specs. Sony's experience shows in the intelligent placement of the PCG-707C's I/O ports and the unit's sturdy construction. Bucking the trend of sacrificing leanness for more features, Sony managed to keep the PCG-707C surprisingly svelte, with a traveling weight of just 6.4 pounds.

The 12.1-inch active-matrix screen is bright and crisp, generating 16.8 mil- ▶

What you pay for.
What you get.

Plymouth Neon

Plymouth Breeze

Plymouth Voyager

There's a whole lot more to Plymouth than just a great price. We've made a pretty big splash with the automotive press by winning a 1997 *Consumers Digest* "Best Buy" Award,* the 1997 *Automobile Magazine* "All-Star" Award* as well as the *Car and Driver* "10 Best" Award (get this) two years in a row.▲ And soon to be making ripples of its own, Plymouth Prowler. To find out more, call 1-800-PLYMOUTH or drop by our Web site at www.plymouthcars.com.

→ That's Plymouth.

*Plymouth Voyager '97 Model Year. ▲Plymouth Voyager '96, '97 and Plymouth Breeze '97.

lion colors at 1024 by 768 resolution. The PCG-707C also has good ergonomics, with a well laid out keyboard and a responsive touchpad.

This notebook is loaded for multimedia, with good stereo sound, 3D acceleration, full-screen MPEG playback, and an 8X–14X CD-ROM drive. Also, the 33.6-kbps voice-enabled fax-modem can function as a speakerphone. Sony throws in Microsoft Works, Sidekick, and Quicken as well.

Sony PCG-707C

You get a plain-English user guide, and toll-free tech support is available 24 hours a day. Sony has had no time to rack up a service and system reliability track record for its notebooks, however.

BUDGET NOTEBOOKS

This Month's Best Buys

1 CTX EZBOOK 750MS

PRO: Impressive speed, nice sound for a notebook

CON: Lackluster screen, no weekend support

When you're shopping on a budget, price is the number one consideration. So it's little surprise ▶

TOP 20 NOTEBOOK PCs — TEST REPORT

	POWER NOTEBOOKS	CPU	RAM (MB)	Secondary cache (K)	PC WorldBench score
1	WinBook FX*	Pentium MMX-166	48	256	218
2	Gateway 2000 Solo 9100*	Pentium MMX-233	32	512	242
3	Dell Latitude LM M166ST	Pentium MMX-166	40	256	212
4	Micron Transport XKE P166 A	Pentium MMX-166	32	512	221
5	Gateway 2000 Solo 2200	Pentium MMX-166	40	256	218
6	Transmonde Vibrant 166Tmx	Pentium MMX-166	48	256	218
7	Sony PCG-707C	Pentium MMX-166	32	256	212
8	Gateway 2000 Solo 2100	Pentium MMX-150	40	256	200
9	Dell Latitude XPi CD M166ST	Pentium MMX-166	32	256	199
10	Compaq Presario 1080	Pentium MMX-166	16	256	197
	BUDGET NOTEBOOKS				
1	CTX EzBook 750MS*	Pentium MMX-150	16	256	198
2	Gateway 2000 Solo 2300*	Pentium-133	32	256	196
3	CTX EzBook 730 CDT	Pentium-133	16	256	172
4	Fujitsu LifeBook 435Dx	Pentium MMX-133	16	256	192
5	Fujitsu LifeBook 420D	Pentium-120	16	–	145
6	WinBook XP5 Pro P150	Pentium-150	16	256	183
7	AMS TravelPro 105CS	Pentium-150	16	256	169
8	Toshiba Satellite 225CDS	Pentium-133	16	256	165
9	AcerNote Light 382	Pentium-150	16	256	170
10	Digital HiNote VP 560	Pentium-133	16	256	150

*Best Buy

Application test times in minutes

Word 7.0 for Windows 95 · Picture Publisher 6.0 for Windows 95 · WordPerfect 6.1 for Windows · Excel 7.0 for Windows 95 · Paradox 5.0 for Windows · 1-2-3 release 5 for Windows

HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

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that the low-price CTX EzBook 750MS stays at the top of the budget chart this month, despite a serious challenge from the more fully configured (but much more expensive) Gateway 2000 Solo 2300. Compared with other notebooks here, CTX's Pentium MMX-150 EzBook 750MS is unusually fast, although the Solo comes close—surprising considering the latter's Pentium-133 CPU.

CTX EzBook 750MS

CTX dropped the price on the EzBook $50 this month to $1749. For this relative pittance, you get 16MB of RAM, a 1.4GB hard drive, good stereo sound, and a useful bundle of software that includes ClarisWorks, Microsoft Plus, and LapLink for Windows 95.

The bargain price comes with some trade-offs, however. The 12.1-inch dual-scan screen is dull at best, and the system's power switch is tricky to use (it must be pushed down especially hard and held for an unusually long time). Also, the documentation is far too rudimentary.

With the CTX you get a one-year warranty, which is typical for most of the industry. But the technical support hours (9 per weekday) are short compared to what most companies offer. We haven't yet received enough fax-back survey responses from CTX customers to rate the company's service and system reliability.

2 GATEWAY 2000 SOLO 2300

PRO: Exceptionally fast for a Pentium-133, outstanding battery life

CON: Screen could be sharper

If you crave the speed of a power notebook but can't afford to spend $3000 or more, check out the $2699 Gateway 2000 Solo 2300. It has the performance and many of the features you'd expect of a power model—yet still manages to make our budget category. In our tests it yielded an impressive PC WorldBench score of 196—the fastest ever for a Pentium-133 notebook, and 5 percent faster than the average Pentium MMX-150 notebook. The Solo's 32MB of SDRAM and 256K of secondary cache played a strong role in this exceptional score.

Gateway 2000 Solo 2300

The Solo 2300 also has a superior battery life: It squeezed just over 7.5 hours from its lithium ion battery. That's the best of any notebook in our Top 20, and it should keep you computing door-to-door on a transcontinental trip, with a reserve left over in case your taxi gets held up in traffic. There's plenty of room to store programs and files on the 2.1GB hard disk, and the 56-kbps x2 PC Card modem will keep you in touch. The 12.1-inch dual-scan screen rivals an active-matrix display in color intensity, although graphics and text could be crisper. The speakers on the 7.8-pound Solo 2300 are adequate, but they won't tempt you to give up your DiscMan. Gateway also tosses in a basic software bundle: Windows 95 and Microsoft Works.

We found the Solo 2300 fairly comfortable to use. The touchpad responded smoothly, and the keys on the keyboard are full-size. We wish that Gateway had textured the keys to make them less slippery, however. This notebook is solidly built, with little flexibility in the case, screen panel, or port covers. An extra modular bay can accept either the floppy drive or the 10X CD-ROM drive.

As usual, Gateway provides very good documentation. The manual includes helpful, colorful diagrams and an index for quick reference. There's also a separate manual for the Gateway modem. If you need more information than the manuals provide, you can call Gateway's toll-free tech support, available around the clock. The company backs this notebook with a one-year parts and labor warranty. Our readers rate system reliability as average for Gateway's notebooks. Although several months back our ongoing fax-back poll reported a sharp increase in problems not resolved, our data now shows that the company's support quality is again on the upswing.

New This Month

The following PC made our Budget Notebooks chart for the first time this month. For original reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

8 TOSHIBA SATELLITE 225CDS

PRO: Quick, well built, excellent RAM expandability

CON: Oversensitive eraserhead pointing device

The good-looking Toshiba Satellite 225-CDS delivers very good performance at a modest $1999 price. But an unexceptional set of features and subpar support quality keep it from rising higher on our chart.

The Satellite isn't without its strong points. For example, the 12.1-inch dual-scan screen is reasonably bright and crisp. And the comfortable keyboard has large, well-placed keys. But Toshiba's eraserhead pointing device takes some getting used to; we found it irritatingly hard to control. The 1.3GB hard disk, 10X CD-ROM drive, and 16-bit onboard sound are all average offerings for this class of portable. Toshiba does throw in some free software: Microsoft Encarta and Quicken SE.

Toshiba Satellite 225CDS

This notebook is well built, with a sturdy case and screen panel. Although it looks svelte, the 225CDS is heavier than you'd think: With its traveling gear, it tips the scales at 7.8 pounds. Battery life is respectable at about 3.3 hours.

Toshiba did a good job on the manual: It's clearly written, nicely illustrated, and well indexed. Support policies, including the one-year warranty, are only fair. The company offers toll-free round-the-clock tech support—but only for one year. Toshiba's system reliability is average according to our ongoing fax-back poll of reader experiences, and the company's support quality rates below average. ■

Beyond the Top 20

We evaluated these systems along with the others, but they didn't score high enough to reach the Top 20 Notebook PCs chart. For write-ups, see PC World Online (www.pcworld.com/t20pcs).

- **Fujitsu LifeBook 6000 P150**
- **HP OmniBook 2000CS**

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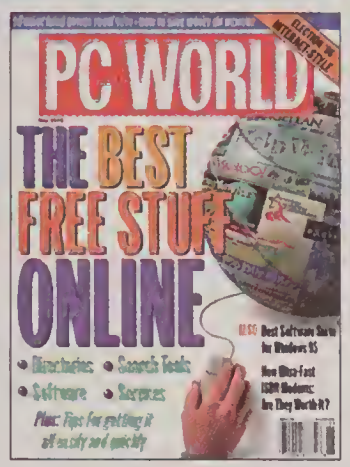

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Win a Pentium MMX-200 PC

Have you ever contacted your PC maker for service and support? Or has your PC been trouble-free? Tell us about it! Fill out and fax in the questionnaire below—even if you have no problems to report, and even if you have responded to this survey before—and we'll enter you in a drawing to win a Quantex QP5/200 SM1 MMX, a Pentium MMX-200 PC in this month's Top 20. Send in a separate copy of the survey for each of your PCs.

HOW TO ENTER: FOR BEST RESULTS, PHOTOCOPY THIS PAGE. Fax your completed survey to 415/357-4522. Do NOT fax a cover page. Or mail it to *PC World*, Box 11-SS, c/o 800-SCAN, 543 Howard St., San Francisco, CA 94105-3013. Surveys must be received by November 30.
PRIZE: One entry per person. IDG employees and their families are not eligible. One prize will be awarded through a random drawing. *PC World* will make reasonable efforts to contact winners by telephone and fax. If *PC World* is unable to do so within 30 days of the drawing, a new winner will be selected. No purchase necessary. Void where prohibited by law.
HOW TO FILL OUT THE FORM: Print your name (block capital letters) and your fax number, and fill the circles for each digit of your daytime phone number. Then fill out the questionnaire. AVOID GOING OUTSIDE THE LINES!

LAST, FIRST NAME

FAX NUMBER — —

ZIP CODE

Please fill in your daytime phone number below.

1	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○
3	○	○	○	○	○	○	○	○	○	○
4	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	○	○	○
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8	○	○	○	○	○	○	○	○	○	○
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How did you get this copy of *PC World?*
○ By subscription ○ On the newsstand ○ From someone else

ABOUT YOUR PC

Who is the manufacturer of the PC you use most frequently?

○ Acer ○ Acma ○ ALR ○ Apple ○ AST ○ Austin (IPC) ○ Compaq ○ Compudyne ○ Comtrade ○ CTX ○ CyberMax ○ Dell
○ Diamond ○ Digital (DEC) ○ DTK ○ EPS ○ Epson ○ Everex ○ Fujitsu ○ Future Tech ○ Gateway 2000 ○ Hewlett-Packard ○ HiO ○ Hitachi
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○ Packard Bell ○ Panasonic ○ PerComp ○ Pionex ○ Polywell ○ Quantex ○ Robotech ○ Samsung ○ Sharp ○ Sony ○ Swan ○ Sys Tech.
○ Tangent ○ Texas Instruments ○ Toshiba ○ Twinhead ○ Unisys ○ USA Flex ○ Vektron ○ WinBook ○ Xi ○ Zenith (ZDS) ○ Zenon ○ Other

What size is this PC?
○ Desktop
○ Notebook/laptop

What is the CPU?
○ PowerPC ○ Pentium ○ Pentium Pro ○ Pentium MMX ○ Pentium II ○ Other _____
○ 6x86 ○ 6x86MX ○ MediaGX ○ K5 ○ K6

Where did you buy this PC?
○ Local dealer
○ Mail/phone order
○ Direct from field sales force
○ Membership discount store
○ Computer superstore
○ Home electronics store
○ Retail store
○ Value-added reseller
○ Other

After ordering, how long did it take to get your PC?
○ Less than 1 week
○ 1-2 weeks
○ 3-4 weeks
○ More than 4 weeks

Who set up your PC?
○ Dealer/retailer/VAR
○ Staff computer technician
○ Self or coworker

Where do you use this PC? ○ At home/home office ○ At work ○ Both

WHEN YOU FIRST GOT YOUR PC

When did you buy this PC? (Specify month and year.)
○ Jan ○ Feb ○ Mar ○ Apr ○ May ○ June ○ July ○ Aug ○ Sept ○ Oct ○ Nov ○ Dec
○ 92 ○ 93 ○ 94 ○ 95 ○ 96 ○ 97

When you first set up your PC, were any components "dead on arrival" (DOA)?
○ Yes ○ No ○ Don't know

If so, which component was it? (Mark all that apply.)
○ Battery ○ CD-ROM ○ CPU ○ Floppy drive
○ Graphics/video board ○ Hard drive ○ Keyboard ○ Memory
○ Modem/fax board ○ Monitor/screen ○ Motherboard ○ Mouse
○ Power supply ○ Sound board ○ Other

Did your problem occur only after you added your own hardware or software?
○ Yes ○ No ○ Don't know

Would you buy this brand of PC again?
○ Yes ○ No ○ Not sure

How many times have you had a problem with this PC?
○ No problem ever ○ One ○ Two ○ Three ○ Four ○ More than four

If you have had a problem that you have not reported in a previous survey, please fill out the right column. If you are reporting a DOA for the first time, skip to the service section.

NEW PROBLEM REPORT

Answer for the most recent problem—*other than DOA*—not reported in a prior survey.

When did this problem occur? (Specify month and year.)
○ Jan ○ Feb ○ Mar ○ Apr ○ May ○ June ○ July ○ Aug ○ Sept ○ Oct ○ Nov ○ Dec
○ 92 ○ 93 ○ 94 ○ 95 ○ 96 ○ 97

How long after you purchased your PC did the problem occur?
○ Less than 1 month ○ 1-3 months ○ 4-6 months ○ 7-12 months ○ More than 12 months ○ Not sure

Did the problem occur as a result of adding new hardware or software?
○ Yes ○ No ○ Don't know

Did the problem occur under warranty?
○ Yes ○ No ○ Don't know

What was the problem finally identified as? (Mark all that apply.)
○ Faulty component ○ Incorrectly installed software ○ Wrong configuration ○ Faulty peripheral ○ Device conflicts ○ OS problem ○ Other ○ Don't know

If a component failed, which one was it? (Mark all that apply.)
○ Battery ○ CD-ROM ○ CPU ○ Floppy drive
○ Graphics/video board ○ Hard drive ○ Keyboard ○ Memory
○ Modem/fax board ○ Monitor/screen ○ Motherboard ○ Mouse
○ Power supply ○ Sound board ○ Other

SERVICE

Please use this section to describe the service and support you received for the problem reported above or the DOA reported at left.

Who fixed your PC?
○ Manufacturer
○ Dealer/store where purchased
○ Manufacturer's authorized repair technician
○ Self ○ Other

What types of service and support did you receive? (Mark all that apply.)
○ Phone ○ On site ○ In store
○ System swap ○ Component swap ○ Factory return

If you received phone service, how long were you on hold?
○ Not at all ○ Less than 1 minute ○ 1-2 minutes ○ 3-5 minutes ○ 6-10 minutes ○ 11-20 minutes ○ More than 20 minutes

How long did it take before you talked to the person who finally helped you?
○ Less than 15 minutes ○ 15 minutes-1 hour ○ 2-5 hours ○ 6-10 hours ○ 11-24 hours ○ 1½-2 days ○ 3-5 days ○ 1 week or more

How long did it take to resolve the problem completely?
○ 1-2 days ○ 3-7 days ○ 8-14 days ○ 15-30 days ○ More than 1 month ○ Never resolved ○ Awaiting resolution

Was it resolved to your satisfaction?
○ Yes ○ No

How would you rate the person(s) who helped you?

	Poor		Good		Excellent
Courtesy	○	○	○	○	○
Knowledge	○	○	○	○	○
Follow-through	○	○	○	○	○

Based on the service and support you received, would you buy this brand of PC again?
○ Yes ○ No

On the whole, how satisfied are you with the service and support you received?
○ Not at all ○ ○ Satisfied ○ ○ Extremely satisfied

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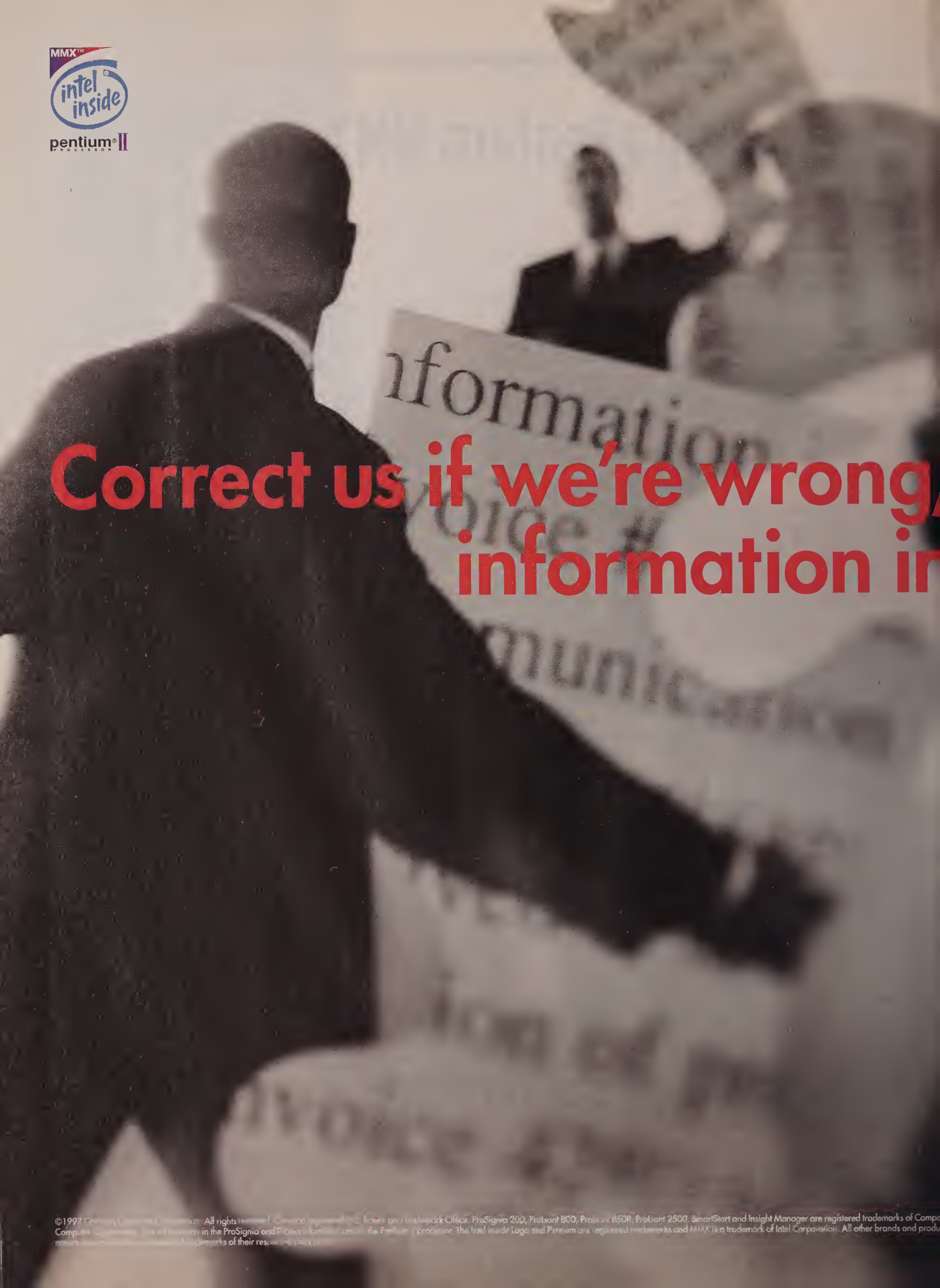

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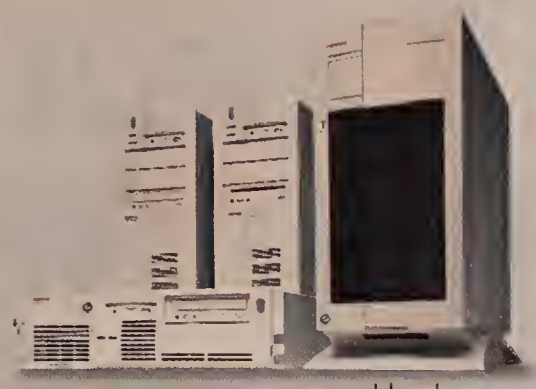

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but we presume all of the your company is critical.

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Full ***16.0" viewing area*** *shows more of what's on your screen*

Sharp, crisp, flicker- free ***77Hz resolution at 1280 x 1024***

Three-Year Warranty *for CRT parts & labor, of course.*

One-touch On-Screen Display *with digital controls.*

Used to be, there were two ways to get the sharper picture, richer colors and enhanced clarity of Aperture Grille technology. You could buy a high-end professional monitor from a company like NEC, Sony or Mitsubishi, with all the high-end features and a price to match. Or you could spend a lot less. And end up with a stripped-down imitation. Fortunately, that was then.

Now, of course, there's TeleVideo, the company that's been pioneering high-end technology for ordinary folks and quietly selling high-performance monitors at very reasonable prices since 1975. We've got a complete line of large-screen Aperture Grille monitors, including the flagship SVP260 pictured above. All with features comparable to (or even superior to) the Big Names, but at prices you can live with.

So how do we do it? Call **1-800-835-3228** to find out. Or visit us at **www.televideoinc.com**. But for now, let's just say that when you've been in the monitor business since bell-bottoms were cool, you learn a few things.

TeleVideo: good monitors, reasonable prices. (See for yourself.)

	Model	Aperture Grille (mm)	Refresh Rate (Hz) @1600x1200	H-Scan (KHZ)	MSRP ($)
17"*	**TeleVideo SVP260**	**0.25**	**66**	**24-82**	**779**
	Mitsubishi 87TXM	0.25	66	30-86	829
	Sony 17sell	0.25	60	30-85	899
	ViewSonic PT770	0.25	66	24-82	799
17"*	**TeleVideo SVP270**	**0.25**	**75**	**30-95**	**889**
	Eizo-Nano TX-C7S	0.25	73	30-92	1125
	Nokia 447Xi	0.25	n/a	31-92	899
	Sony 17sell	0.25	60	30-85	899
21"*	**TeleVideo SVP350**	**0.28**	**85**	**30-107**	**1649**
	Mitsubishi 91TXM	0.28	75	30-95	1649
	NEC P1150	0.28	75	31-94	1599
	IIYAMA Pro 21	0.30	75	30-94	1699

***Diagonal viewable area may vary.**

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Circle 222 on reader service card

PC WORLD

TOP 10 PRINTERS

	MONOCHROME WORKGROUP PRINTERS	Month tested	Street price (7/14/97)	Overall rating	Speed for plain text (ppm)	Speed for full-page graphics (ppm)	Comments	Reader service number
1	Lexmark Optra S 1650 800/539-6275 www.lexmark.com	July 97	$1275	91	11.6	2.4	**FEATURES:** 16-ppm laser. Standard 4MB of RAM; 600-by-600-dpi resolution (also true 1200-by-1200-dpi); 250 sheets input and output. **PRO:** Extremely fast, easy to use, very good print quality, includes serial port; optional infrared port. **CON:** Documentation sometimes confuses differences between Optra models.	689
2	HP LaserJet 5M 800/752-0900 www.hp.com	July 97	$1539	89	9.6	1.9	**FEATURES:** 12-ppm laser. Standard 6MB of RAM; 600-by-600-dpi resolution; 250 sheets input and output. **PRO:** Very good print quality and design; includes ethernet and LocalTalk, which few workgroup printers have. **CON:** Most expensive monochrome on our chart.	690
3	IBM Network Printer 12 800/358-6661 www.ibm.com	Mar 97	$999	88	8.9	2.4	**FEATURES:** 12-ppm laser. Standard 4MB of RAM; 600-by-600-dpi resolution; 250 sheets input, 270 output. **PRO:** Very good print quality, easy-to-use control panel, round-the-clock technical support. **CON:** Numerous manuals can be confusing, slowest text printer on monochrome chart.	–
4	Lexmark Optra S 1250 800/539-6275 www.lexmark.com	July 97	$1125	88	9.6	2.1	**FEATURES:** 12-ppm laser. Standard 4MB of RAM; 600-by-600-dpi resolution (also true 1200-by-1200-dpi); 250 sheets input and output. **PRO:** Fast, easy to use, very good print quality. **CON:** Fewer options than the Optra S 1650, manual sometimes confuses differences between models.	691
5	Okidata OkiPage 16n 800/654-3282 www.okidata.com	July 97	$999	86	12.4	1.9	**FEATURES:** 16-ppm LED. Standard 2MB of RAM; 600-by-600-dpi resolution; 500 sheets input, 250 output. **PRO:** Low price, fastest text speed overall. **CON:** Tricky installation and control panel, multilingual manual is difficult to use, gray-scale images are overly dark.	692
	COLOR WORKGROUP PRINTERS							
1	Epson Stylus Color 1520 800/463-7766 www.epson.com	Sept 97	$799	94	3.2	0.9	**FEATURES:** 6-ppm monochrome/5-ppm color ink jet. Standard 64K of RAM; 1440-by-720-dpi monochrome/color resolutions; 100 sheets input, 35 output. **PRO:** Extremely inexpensive, gorgeous color quality. **CON:** Very slow text speed, meager paper capacity, needs special paper for best print quality.	693
2	Xerox DocuPrint C55mp Color Laser Printer 800/349-3769 www.xerox.com	Sept 97	$4500	93	8.1	0.5	**FEATURES:** 12-ppm monochrome/3-ppm color laser. Standard 30MB of RAM; 600-by-600-dpi monochrome/color resolutions; 250 sheets input, 150 output. **PRO:** Excellent output, fastest text speed of any color laser we've seen, includes PostScript and ethernet. **CON:** Power switch is inconveniently located.	694
3	Minolta Color PageWorks 888/264-6658 www.minoltaprinters.com	NEW	$2999	90	7.1	0.3	**FEATURES:** 12-ppm monochrome/3-ppm color laser. Standard 4MB of RAM, 600-by-600-dpi maximum resolution, 400 sheets input, 250 output. **PRO:** Very inexpensive, good paper-handling features. **CON:** Print quality is a little grainy, slowest graphics speed on our chart.	695
4	Tektronix Phaser 560 800/835-6100 www.tek.com	Sept 97	$3995	89	6.6	0.5	**FEATURES:** 14-ppm monochrome/4-ppm color laser. Standard BMB of RAM; 600-by-600-dpi monochrome/color resolutions; 250 sheets input, 500 output. **PRO:** Great print quality, prints labels and envelopes in color. **CON:** Replacing fuser and drum is awkward.	696
5	IBM Network Color Printer 800/358-6661 www.ibm.com	May 97	$4500	88	5	0.7	**FEATURES:** 12-ppm monochrome/3-ppm color laser. Standard 16MB of RAM; 600-by-600-dpi monochrome/color resolutions; 250 sheets input, 120 output. **PRO:** Very good print quality, top-notch support policies. **CON:** Heavy at 119.6 pounds, loud, tends to leak fuser oil when moved.	–

Best Buy For expanded reviews, visit www.pcworld.com/t10printers. Windows 95-certified Plug and Play All products: 906

HOW WE TEST The overall rating for both monochrome and color workgroup printers is based on print quality (27 percent), price (20 percent), features and ease of use (20 percent), speed (15 percent), service and support (13 percent), and consumables (5 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

THINKING OF ADDING a color printer to your office? Now is a great time to buy a color laser, which can give you top-notch black text as well as great color. Not long ago these printers were prohibitively expensive, but recently top-quality lasers have plunged from about $7000 to $4000. In the past few months, an influx of these lower-price printers has replaced almost every older, costlier model on our color workgroup chart. ▶

This month, Minolta's Color PageWorks, another bargain-price ($2999) laser, pushes its way into third place, knocking both the Tektronix Phaser 560 and the IBM Network Color Printer down a notch and delivering the coup de grace to the chart's last old-timer, Tektronix's Phaser 350. The PageWorks doesn't produce the sharpest color documents we've ever seen, but they still look good, and it's the most inexpensive workgroup color laser on our Top 10. The Xerox DocuPrint C55mp, which costs about $1500 more, includes PostScript and ethernet.

Only one new monochrome printer—Brother's $699 HL-1060—was available for testing, and it didn't make the chart. This inexpensive laser is a hybrid of sorts: It competes with other workgroup printers in paper capacity for hundreds of dollars less, but it's not any faster than a personal laser. Its graphics output was particularly disappointing.

We looked at one other printer this month, Xerox's innovative but ill-starred DocuPrint 4512. Xerox has been promising for months to fix a driver bug that causes the 4512 to give some graphics a weird, stylized look. But when we finished testing the machine again for this issue, the problem remained, so—as discussed further on—we still can't recommend it.

In the meantime, there are plenty of better monochrome lasers available for not much more than the $1049 DocuPrint. For instance, our Best Buy, Lexmark's $1275 Optra S 1650, offers both blazingly fast speed and terrific print quality.

WORKGROUP COLOR STAYS CHEAP

IF GETTING fantastic-looking color documents matters more to you than fast text printing, look no further than the $799 Epson Stylus Color 1520, a slow but high-quality ink jet that earns our color workgroup Best Buy for the second time in a row. But if your office does a lot of black text printing—hundreds of pages a day—a laser is your best bet.

The Minolta Color PageWorks, the only new color laser on the chart this month, offers both clean, even text and very fast output—a little over 7 pages per minute—for hundreds of dollars less than other color lasers. It doesn't do as well with graphics: At 0.3 ppm, it's about about one-half to two-thirds as fast as the others on the chart. And if you look closely, its gray-scale images and color graphics tend to be a little grainy. Overall, however, the Minolta's print quality is perfectly acceptable, making it a good all-around choice.

Brother rates its new HL-1060 monochrome laser at 10 ppm, so we tested it as a workgroup printer, but it turned out to be much slower than competitors. We clocked text documents at 5.9 ppm—about one-half to two-thirds the speed of other monochrome printers on the chart. (At 2.3 ppm for graphics, the Brother keeps up with the others.) The HL-1060's output quality also proved spotty—it does a good job on text and lines, but gray-scale graphics look gritty, patchy, and very dark.

MINOLTA'S Color PageWorks, the only new printer on this month's chart, offers good quality and performance at a low price.

On the other hand, the HL-1060 is quite a bit less expensive than even the two $999 monochrome models on our chart. With its low price of $699, its 400-page paper capacity, and its (extra-cost) network interface option, this new laser could be a strong choice for small offices that print mostly text.

WAITING FOR XEROX

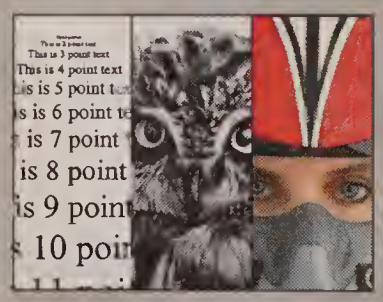
XEROX'S MONOCHROME DocuPrint 4512 has been around for more than six months. It's a fine printer in most respects, and really fast: It prints text at 10.4 ppm and graphics at 2.3 ppm. It's also inexpensive—only $1049, including a built-in duplexer that lets you print on both sides of a page, a feature that usually costs $500 or $600 extra. And print quality is generally good. But the DocuPrint 4512 can't print Adobe Photoshop or CorelDraw graphics correctly (see the print sample on this page).

Xerox acknowledges the problem and recommends that people try the driver from a different model (the 4517) or wait until it fixes the 4512's driver sometime in early 1998. In other words, it's your problem. So unless you're absolutely sure that no one in your office will be using these Adobe and Corel applications, we suggest you continue to hold off on the DocuPrint 4512. We'll retest it again when Xerox thinks it's fixed the software.

—*Dan Littman* ■

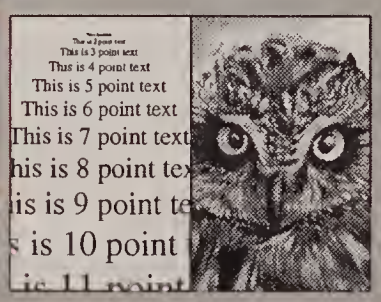
PRINT QUALITY SAMPLES

Good Text From Minolta, IBM, Xerox



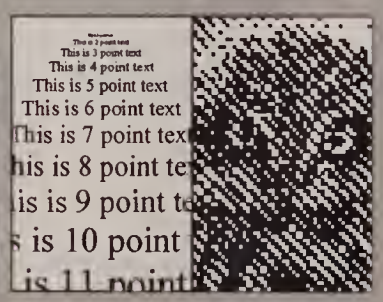
MINOLTA COLOR PAGEWORKS

Text and color quality make Minolta's new laser a fine choice for general printing. It also outputs text in a matte finish that's easier to read than other color laser text.



IBM NETWORK PRINTER 12

Our number three monochrome printer achieves very good text and gray-scale images, although it is a little slow. Its low price helps keep it on our list.



XEROX DOCUPRINT 4512

Although it does well with text, this monochrome laser produced gray-scale images that looked awful. Xerox plans to fix the buggy driver in early 1998.

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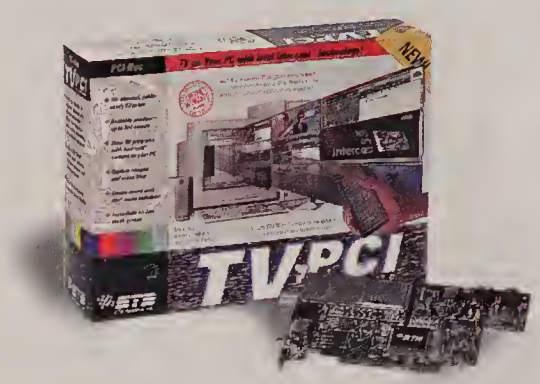

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WINDOWS MAGAZINE 1997 WINLIST

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PC WORLD

TOP 10 MONITORS

	19- AND 21-INCH MONITORS	Month tested	Street price (8/15/97)	Overall rating	Quality of text/graphics	Comments	Reader service number
1	Cornerstone Imaging Color 50/101 SF 800/562-2552 www.corimage.com	NEW	$1565	86	excellent/ excellent	**FEATURES:** 21-inch .27mm dot pitch tube (19.4-inch viewable area), 94-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 11.5-hour weekday toll-free support. **PRO:** Top image quality, with near-perfect text and graphics. **CON:** No auto-save for adjustments, no BNC connector or convergence control.	697
2	Mitsubishi Diamond Pro 1000 800/843-2515 www.mitsubishi-display.com	NEW	$1750	84	very good/ very good	**FEATURES:** 21-inch .28mm DiamondTron tube (19.5-inch viewable area), 107-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 12-hour weekday toll-free support. **PRO:** Sharp text, great graphics, very high refresh rate, easy to adjust, drop-down panel stows controls when not in use. **CON:** Expensive.	698
3	Mitsubishi Diamond Pro 91TXM 800/843-2515 www.mitsubishi-display.com	retested this month	$1550	83	very good/ very good	**FEATURES:** 21-inch .28mm DiamondTron tube (19.5-inch viewable area), 88-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 12-hour weekday toll-free support. **PRO:** Sharp, well-defined text; easy to adjust; drop-down panel stows controls when not in use. **CON:** Plain appearance.	699
4	Hitachi SuperScan Elite 751 800/555-8552 www.nsa-hitachi.com	NEW	$1099	82	very good/ very good	**FEATURES:** 19-inch .26mm dot pitch tube (17.7-inch viewable area), 85-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 8-hour weekday toll-free support. **PRO:** Sharp text, inexpensive, small footprint, easy to adjust. **CON:** No auto-save for adjustments, no BNC connector or convergence control.	700
5	Cornerstone Imaging Color 45/101 SF 800/562-2552 www.corimage.com	NEW	$1295	81	very good/ excellent	**FEATURES:** 19-inch .26mm dot pitch tube (17.6-inch viewable area), 94-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 11.5-hour weekday toll-free support. **PRO:** Terrific graphics and text, easily adjustable, small footprint. **CON:** Expensive for its size, no auto-save, no BNC connector or convergence control.	701
6	ViewSonic PT813 800/888-8583 www.viewsonic.com	NEW	$1399	78	very good/ good	**FEATURES:** 21-inch .28mm DiamondTron tube (19.2-inch viewable area), 100-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 11-hour weekday toll-free support. **PRO:** Crisp text, inexpensive, very high refresh rate. **CON:** Making basic adjustments is too hard, relatively small viewable screen.	702
7	KDS Visual Sensations VS-21 714/379-5599 www.kdsusa.com	NEW	$1350	76	very good/ good	**FEATURES:** 21-inch .28mm dot pitch tube (19.5-inch viewable area), 111-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95-compliant, three-year warranty, 11-hour weekday toll-free support. **PRO:** Inexpensive, very high refresh rate, attractively sculpted front panel, extensive menus. **CON:** Cryptically marked control buttons.	703
8	Nokia Multigraph 445X 800/296-6542 www.nokia.com	NEW	$2069	76	very good/ very good	**FEATURES:** 21-inch .26mm dot pitch tube (19.4-inch viewable area), 100-Hz refresh rate,[1] built-in mike and speakers, Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 12-hour weekday toll-free support. **PRO:** Crisp text, saves multiple custom configurations, nice sound, distinctive good looks. **CON:** Expensive.	704
9	Panasonic PanaSync S21 800/742-8086 www.panasonic.com	retested this month	$1399	76	good/ very good	**FEATURES:** 21-inch .25mm dot pitch tube (19.7-inch viewable area), 88-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 24-hour toll-free support. **PRO:** Inexpensive, relatively large viewable area, long support hours, easy-to-use on-screen controls. **CON:** No controls for convergence or tilt.	705
10	NEC Multisync PII150 800/832-4636 www.nec.com	NEW	$1599	76	good/ good	**FEATURES:** 21-inch .28mm DiamondTron tube (19.7-inch viewable area), 88-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 12.5-hour weekday toll-free support. **PRO:** Relatively large viewable area, distinctive good looks, ample controls. **CON:** Confusing drop-down menu arrangement takes getting used to.	706

Best Buy For expanded reviews, visit www.pcworld.com/t10monitors. All products: 908

[1] Highest refresh rate at 1280 by 1024 resolution. [2] Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play.

HOW WE TEST Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on text and graphics quality (25 percent each), features and ease of use (25 percent), price (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

IT MAY BE TIME to get that big monitor off your wish list and onto your desk. Of 15 models in this month's review, 8 new ones made the chart—and 5 cost less than $1400. The 19-inch Hitachi is just $1099 and has 25 percent more viewing area than a 17-incher. The 21-inch KDS costs $1350 and puts 20 percent more on screen than a 19-incher. The 21-inch Cornerstone has the best image; graphics pros will want the features of the Mitsubishi, at number two. ■

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The World's Easiest Video Editor

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1

AUTOMATICALLY FIND SCENES

You've just come back from vacation with three hours of tape. Sure you have some great scenes, but, as usual, you've got some long boring stuff that slows the whole thing down. Easy to solve—just play the scenes though the Studio Mixer. It automatically detects and marks the beginning and end of each scene, grabbing the first frame of every scene and remembering where it is on the tape. No other home video editing solution can do this.

2

ORDER SCENES, ADD TITLE EFFECTS & TRANSITIONS

Now simply drag the image of the scenes you want to use in your final tape and drop them in the order you want. Now you can use some of the Emmy-award winning effects included in the box. Choose from over 100 wipes, fades and dissolves. Add translucent titles (anti-aliased for smooth edges) to show the places you went and introduce the people you met. You can even create a professional soundtrack with sound effects, music and narration.

3

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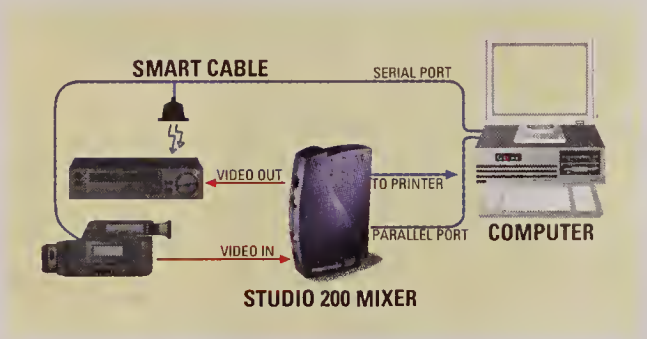

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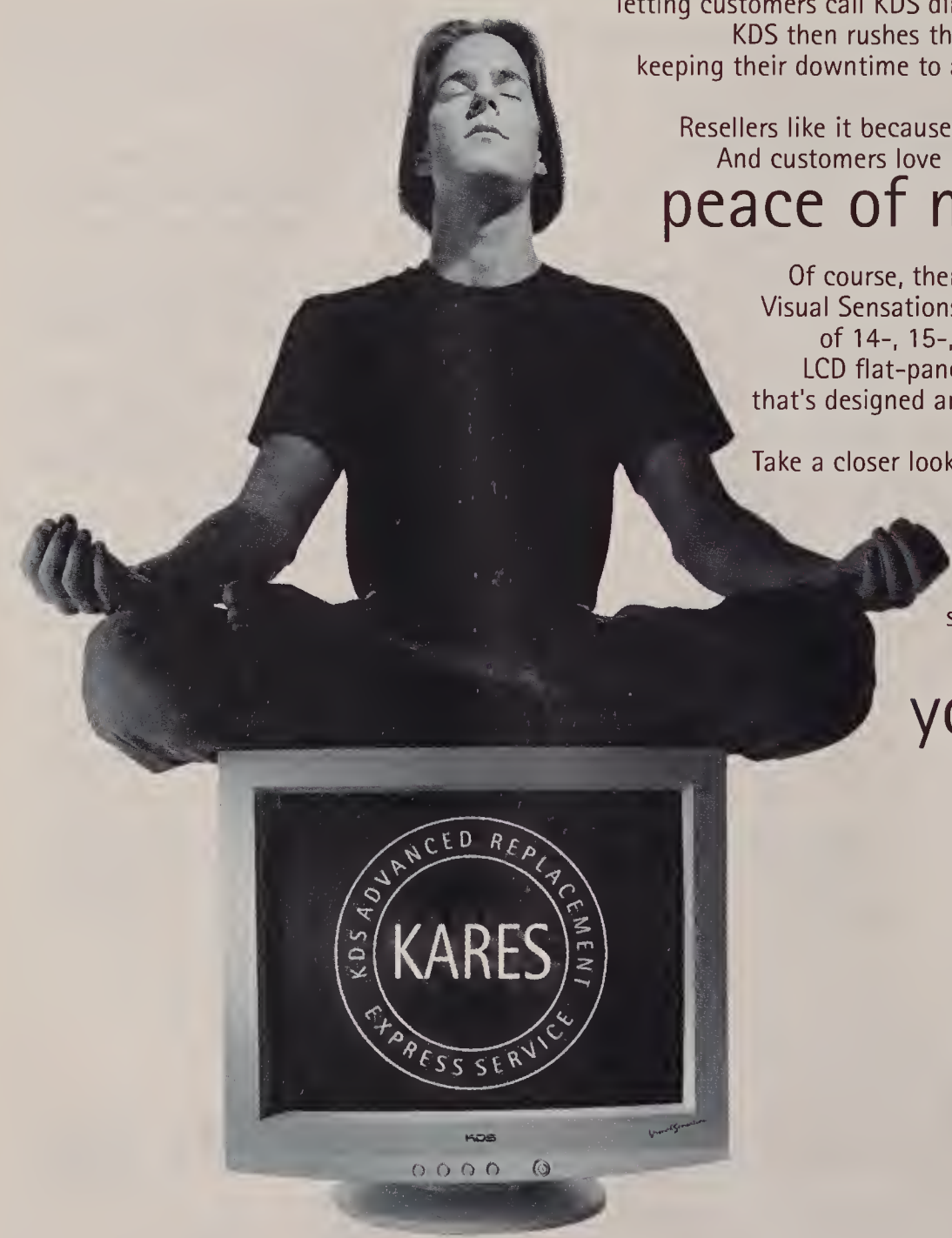

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PC WORLD

TOP 10 GRAPHICS BOARDS

	GRAPHICS BOARDS	Month tested	Street price (8/15/97)	Overall rating	PC WorldBench graphics score/ rating	3D rating	Multimedia rating	Comments	Reader service number
1	ATI 3D Pro Turbo PC2TV 905/882-2600 www.atitech.com	Oct 97	$219	98	189/ very good	good	outstanding	**FEATURES:** 8MB of SGRAM, 200-MHz RAMDAC, ATI Rage II chip, bundled 3D modeling, image editing, and VRML software. **PRO:** Terrific multimedia performance, nice 3-D, connects to TV. **CON:** Expensive, mediocre video playback, no toll-free support.	663
2	Diamond Stealth 3D 3000 800/468-5846 www.diamondmm.com	Oct 97	$170	96	191/ outstanding	adequate	very good	**FEATURES:** 4MB of VRAM, 220-MHz RAMDAC, S3 Virge/VX chip, bundled 3D game, 3D design software, and multimedia encyclopedia. **PRO:** Fast in 2D, great in two of three 3D game tests. **CON:** A bug messed up one game, no toll-free support.	664
3	ATI 3D Xpression+ PC2TV 905/882-2600 www.atitech.com	Oct 97	$129	95	190/ outstanding	adequate	adequate	**FEATURES:** 4MB of SGRAM, 170-MHz RAMDAC, ATI Rage II chip, bundled 3D games plus 3D modeling, image editing, and VRML software. **PRO:** Great 2D, decent 3D, nice bargain, connects to a TV. **CON:** Mediocre video playback, no toll-free support.	665
4	STB Nitro 3D 800/234-4334 www.stb.com	Oct 97	$149	94	190/ outstanding	adequate	adequate	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/GX chip, bundled 3D games. **PRO:** Affordable, fast 2D, toll-free support, lifetime warranty. **CON:** Below-average 3D game play, a bug messed up one game test.	666
5	Diamond Stealth 3D 2000 Pro 800/468-5846 www.diamondmm.com	Oct 97	$135	94	191/ outstanding	adequate	very good	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/DX chip, bundled 3D game plus photo editing software and multimedia encyclopedia. **PRO:** Great 2D, inexpensive, connects to TV. **CON:** A bug messed up one game test, no toll-free support.	667
6	STB Velocity 128 800/234-4334 www.stb.com	NEW	$199	93	189/ very good	very good	adequate	**FEATURES:** 4MB of SGRAM, 230-MHz RAMDAC, nVidia Riva 128 chip, bundled games and 3D image software. **PRO:** Excellent 3D quality and 2D performance, good software bundle for gamers. **CON:** Poor AVI video playback.	668
7	Hercules Terminator 3D/DX 800/532-0600 www.hercules.com	Oct 97	$149	92	189/ very good	adequate	very good	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/DX chip, bundled 3D games. **PRO:** Good price, quick in multimedia programs, excellent AVI video playback, toll-free support. **CON:** Subpar 3D image quality, driver bug in one game.	669
8	STB Velocity 3D 888/234-4334 www.stb.com	Oct 97	$199	91	189/ very good	poor	adequate	**FEATURES:** 4MB of EDO VRAM (upgradable to 8MB), 220-MHz RAMDAC, S3 Virge/VX chip. **PRO:** Good for graphics pros, toll-free support, lifetime warranty. **CON:** Poor for 3D games overall, driver bug in one game, choppy video playback.	700
9	Matrox Millennium II 800/361-1408 www.matrox.com/mga	Oct 97	$199	90	191/ outstanding	good	good	**FEATURES:** 4MB of WRAM (upgradable to 16MB), 250-MHz RAMDAC, Matrox MGA-2164W chip, bundled image editing software. **PRO:** Price drop pulls board onto chart, excellent 2D. **CON:** No hardware filtering for 3D, no toll-free or weekend support.	701
10	Matrox Mystique 220 800/361-1408 www.matrox.com/mga	Oct 97	$179	89	190/ outstanding	adequate	good	**FEATURES:** 4MB of SGRAM (upgradable to 8MB), 220-MHz RAMDAC, Matrox MGA-1164SG chip, bundled 3D games and VRML software. **PRO:** Fast all around, easy to install and use. **CON:** Direct3D games look bad, no toll-free or weekend support.	702

Best Buy For expanded reviews, visit www.pcworld.com/t10graphics. All products: 904

HOW WE TEST We tested PCI boards under Windows 95 with PC WorldBench 1.0 at 800 by 600 and 16.8 million colors, 1024 by 768 and 65,536 colors (reported here), and 1280 by 1024 and 65,536 colors. The 3D rating is based on frame rates in our VRML and 3D game tests and on subjective ratings in three games. The multimedia rating is based on frame rates in our Macromedia Director and AVI playback tests and on timed scores in our PowerPoint multimedia presentation tests. Boards were tested in a Dell Dimension XPS P133c with 32MB of EDO DRAM and 256K of pipeline-burst secondary cache. The overall rating is based on performance (40 percent), features (30 percent), price (20 percent), and support policies (10 percent). For all scores, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

ONLY ONE NEW graphics board lands on our chart this month: The STB Velocity 128, in sixth place, has the best-quality 3D we've seen yet—crisp, and without driver bugs. The Velocity is also a great choice for standard business applications. So why didn't it rank higher? It plays AVI video at less than 8 frames per second, making images extremely choppy. A price drop from $319 to $199 pulls the Matrox Millennium II into spot nine. ■

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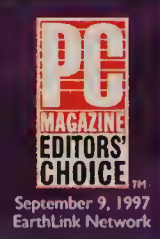

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PC WORLD

TOP 10 MODEMS

	33.6-KBPS INTERNAL MODEMS	Month tested	Street price (8/12/97)	Overall rating	Average transfer time per MB (min:sec)	Comments	Reader service number
1	Hayes Optima 336B Internal Business Modem 800/377-4377 www.hayes.com	July 97	$189	81	2:31	**FEATURES:** 16-bit card, FlashROM, Caller ID, voice mail, distinctive ring, SmartCom Message Center LE fax/data software. **PRO:** Fastest 33.6-kbps modem on chart, full security features, cross-ship replacement. **CON:** No support available on the weekends, long 8.5-inch card may conflict with other PC components.	746
2	3Com/U.S. Robotics Courier V.Everything 33.6K Internal 800/877-2677 www.3com.com	July 97	$215	80	2:44	**FEATURES:** 8-bit card, FlashROM, Caller ID, distinctive ring, QuickLink II fax/data software. **PRO:** Thorough and accessible documentation, toll-free tech support, cross-ship replacement, great software bundle includes remote access program. **CON:** Most expensive 33.6-kbps modem on chart.	747
3	Zoom FaxModem V.34I Plus 800/631-3116 www.zoomtel.com	July 97	$79	80	2:38	**FEATURES:** 8-bit card, MNP-10EC cellular protocol, distinctive ring, COMit and WinFax Lite fax/data software. **PRO:** Flawless installation, good performer, very inexpensive, cross-ship replacement, seven-year warranty. **CON:** Lacks security features such as password access to modem and Caller ID support.	748
4	Diamond Multimedia SupraExpress 336i Sp 800/727-8772 www.diamondmm.com	July 97	$100	79	2:45	**FEATURES:** 8-bit card, distinctive ring, full-duplex speakerphone, ASVD, Caller ID, COMit and FaxTalk Messenger fax/data software. **PRO:** Great support policies including technical support available 14 hours per weekday and 8 hours on Saturday, very affordable price. **CON:** Performance is a little sluggish.	749
5	Wisecom Accelerator IV 33600 Internal Voice Modem 888/947-3266 www.wisecominc.com	July 97	$87	78	2:42	**FEATURES:** 16-bit card, distinctive ring, voice mail, full-duplex speakerphone, allows a data and voice call to share a phone line using ASVD, Caller ID, SuperVoice voice/fax/data software. **PRO:** Inexpensive, toll-free technical support. **CON:** Installation is a nightmare, not FlashROM upgradable.	750
	56-KBPS INTERNAL MODEMS						
1	IBM 56K Modem Internet Kit 800/426-2968 www.pc.ibm.com	NEW	$149	79	2:39/3:17 [1]	**FEATURES:** x2 protocol, 8-bit ISA card, V.80, distinctive ring, Caller ID, voice mail, speakerphone, DSVD, QuickLink Message Center fax/data package. **PRO:** Feature-rich, round-the-clock support, very good software bundle. **CON:** Manuals need improvement, free upgrade to upcoming 56K standard only if software-based.	–
2	3Com/U.S. Robotics Courier V.Everything 56K Internal 800/877-2677 www.3com.com	NEW	$260	79	2:33/2:57 [1]	**FEATURES:** x2 protocol, 8-bit ISA card, distinctive ring, callback, Caller ID, RapidComm fax/data package. **PRO:** Fast toll-free support, terrific software bundle, unconditional free upgrade to 56K standard, even if a modem swap is required. **CON:** Expensive, live support available only during the week.	751
3	Zoom FaxModem 56K Model 2819 800/631-3116 www.zoomtel.com	NEW	$149	77	2:35/3:08 [1]	**FEATURES:** K56flex protocol, 16-bit ISA card, V.80, MNP-10EC, WinFax Lite and COMit for Windows fax/data package. **PRO:** Low price, generous support hours including Saturday, easy-to-use software, free upgrade to upcoming 56K standard. **CON:** Support call is on your dime, installation is a little rough.	752
4	Diamond Multimedia SupraExpress 56i 800/727-8772 www.diamondmm.com	NEW	$120	77	2:36/3:04 [1]	**FEATURES:** K56flex protocol, 16-bit ISA card, V.80 videoconferencing, distinctive ring, FaxTalk Plus and COMit fax/data package. **PRO:** Very low price, long support hours including weekend, very good software bundle, smooth installation. **CON:** Free upgrade to 56K standard doesn't include hardware swap.	753
5	Motorola ISG ModemSurfr 56K Internal Data/Fax Modem 800/566-3266 www.mot.com/modems	Sept 97	$159	76	2:33/3:07 [1]	**FEATURES:** K56flex protocol, 16-bit ISA card, V.80 videoconferencing, distinctive ring, Caller ID, Trio Communications Suite 5.1 fax/data package. **PRO:** Affordable, nice feature set, smooth installation, unconditional free upgrade to 56K standard. **CON:** No troubleshooting guide.	754

Best Buy online For expanded reviews, visit www.pcworld.com/t10modems. [1]V.34 TAS transfers/56-kbps ISP downloads; see "How We Test." All products: 910

HOW WE TEST We test 33.6-kbps modem-to-modem performance using a pair of identical modems on a Telecomm Analysis Systems simulated phone network. It sends a text file over 55 line conditions, and a mix of five files—graphics, text, program, and compressed files—over one line condition. For our 56-kbps tests, we call a local Internet service provider access number and transfer .jpg, .doc, and .zip files continuously over an 18-hour period. The times to transfer a megabyte of data are higher in the ISP test than in the TAS test because the files used in the former are less compressible. Results for the two tests are not comparable. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

LOOKING FOR A FAST modem for your small or home office? Check out IBM's 56K Modem Internet Kit. It's the only 56-kbps unit on the chart with voice-mail and speakerphone capabilities, it's very affordably priced at $149, and it's the only modem here that's backed by round-the-clock support. Meanwhile, Hayes sliced $60 off the price of its Optima 336B, springing this fast and feature-packed card to the head of the 33.6-kbps modem chart. ■

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Business Lease: $174/mo.
Code #E6205

Express5800 LE2200
- 233MHz Pentium II processor, 512KB L2 Cache (Dual Capable)
- **32MB ECC DIMM Memory (512MB max)**
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- * 32MB of ECC memory, add $189
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- * PCI Ultra Wide SCSI RAID Controller, add $1349
- * PCI 10/100 Ethernet Card, add $79
- * MS Windows NT Server 4.0, add $799

$3079
Business Lease: $111/mo.
Code #E6206

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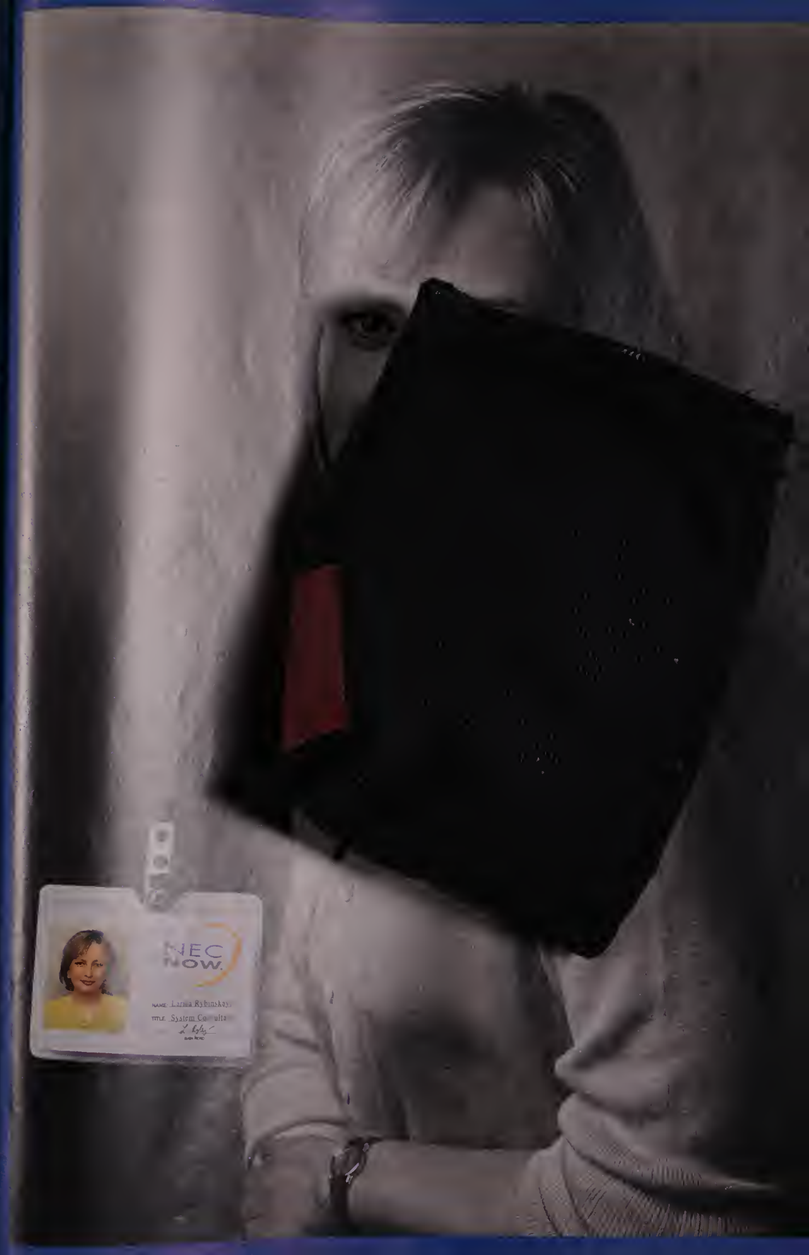

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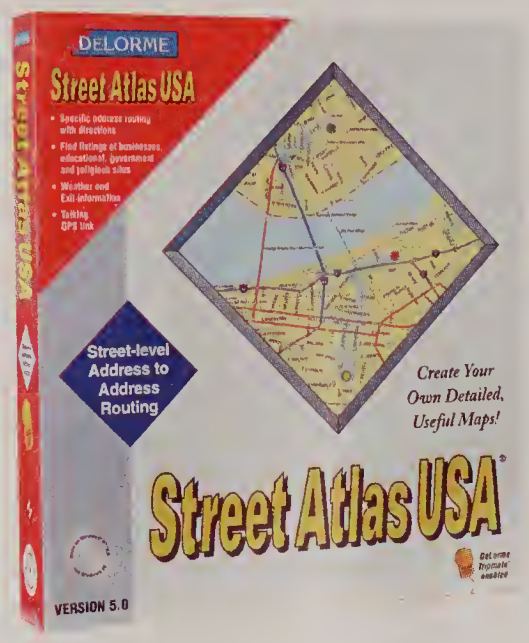

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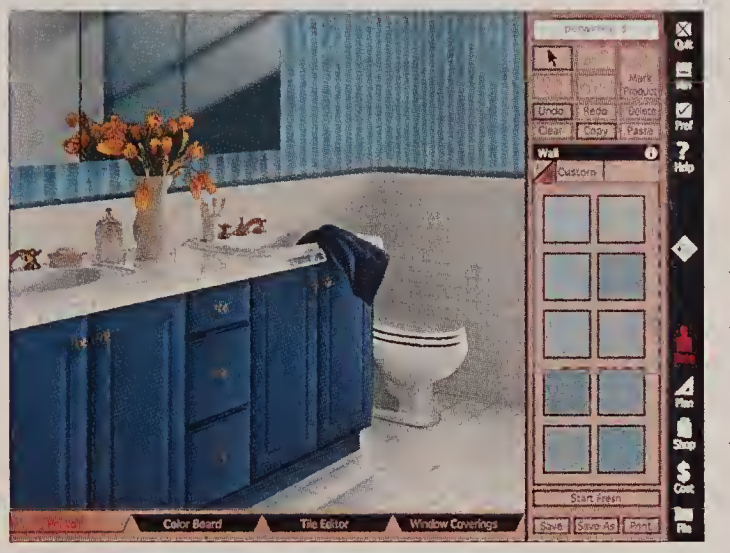
I RELY ON MY computer to make me look like I have more time than I really do. It's a virtual production shop of cards, thank-you notes, and invitations—all the little niceties I used to leave to people with more spare time. My newest tool is the classiest yet: **The Print Shop Signature Greetings** with art from the Marcel Schurman Company (Schurman cards are found in Papyrus stores). With just a few mouse clicks, I wind up with personalized greeting cards, labels, postcards, and envelopes, all of which look like I bought them at a swank shop. The only downside: Unlike its competitors, Micrografx CreataCard and Microsoft Greetings Workshop, this product doesn't remind me about upcoming events. It features a pretty slick address book, though, that does seamless mail merge. Now I can complete a mass mailing in the time it takes to feed the dog. It's a keeper. —*Christina Wood*

The Print Shop Signature Greetings

GRADE: **B+**; PRICE: $29.95 list; Broderbund; 800/548-1798; www.broderbund.com

READER SERVICE NO. 718



YOUR DREAM BATHROOM: Picture This Home: Bath makes it easy to design your new bathroom.

FLUSH WITH SUCCESS

TIM "THE TOOL MAN" TAYLOR of *Home Improvement* would scoff at **Picture This Home: Bath**—he doesn't like doing things the easy way. And this title makes redesigning your bathroom a snap. Start from scratch, or choose a prefab floor plan. Map out your toilet, sink, cabinets—hey, you can even throw in a whirlpool. All the fixtures are drawn for you, so you just drag and drop. Next, pick the specific products you want from a catalog of sinks, tubs, and so on, complete with full-color photos and manufacturers' phone numbers. And don't forget the bottom line: The software keeps track of expenses. —*Brad Grimes*

Picture This Home: Bath

GRADE: **B+**; PRICE: $50 street; Autodesk; 800/215-9742; www.picturethishome.com

READER SERVICE NO. 719

RISK OR REWARD?

INVESTING IN THE stock market can be chancy. But if you're ready to "beat the Street" and look for bigger rewards, **Stock Shop With Peter Lynch** is a good place to start. It opens with a tutorial on how to find an investment-worthy company. You get strategic investing advice and succinct explanations of balance sheets, income statements, and the like. Once you master the basics, Stock Shop helps you download and analyze any company's financial information via Telescan, an online stock research service (after a 10-day free trial, Telescan costs $6.95 per month). For the initiate, Stock Shop is great, but more experienced investors may find it too simple. The brave of ▶

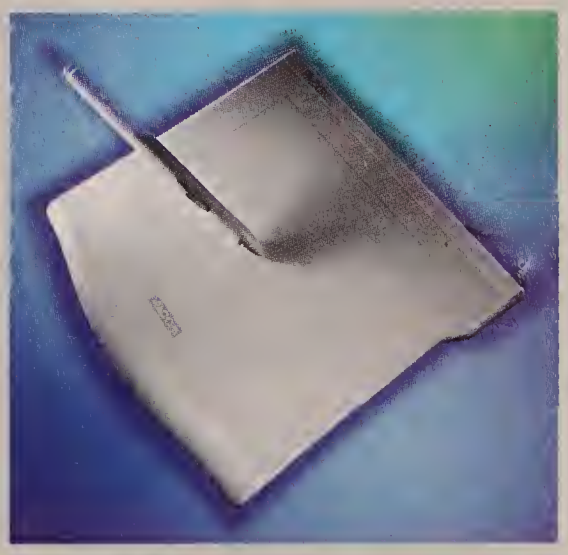
Pen Pals

WE ALL KNOW that drawing with a mouse is awkward. If you've ever tried to design and draw greeting cards on your PC, you've probably given up in frustration. Well, maybe you're using the wrong tools. The pressure-sensitive PenPartner graphics tablet makes it easy to create your own designs or edit photos on your PC. The $100 PenPartner has some cool features—an UltraPen eraser works just like the real thing, and a button can be programmed to perform the mouse's right-click or double-click. If you can't part with your mouse, no problem—the two devices can coexist amicably. The tablet and pen come bundled with Corel's PrintHouse and PhotoHouse, so you can get started on that perfect greeting card. **—Angela Freeman**

PenPartner With UltraPen

GRADE: **A**; PRICE: $99.95 list; Wacom Technology; 800/922-6613; www.wacom.com

READER SERVICE NO. 721



TAKE CONTROL: It's easy to navigate with precision using the PenPartner and UltraPen.

PHOTOGRAPH: ROBERT CARDIN

EDITED BY Christina Wood

heart may prefer to spend their $69.95 on some fat-growth stock. —*Kirk Steers*

Stock Shop With Peter Lynch

Grade: **B**; PRICE: $69.95 list; Houghton Mifflin Interactive; 800/829-7962; www.hminet.com

READER SERVICE NO. 720

INTO AFRICA

IS AFRICA ONE OF the places on your list of must-sees? Before you shell out the bucks for a Fodor's and a plane ticket, check out **Wild Africa: Okavango**, an interactive guide to four parks in Botswana and Zimbabwe, including Okavango, Chobe, and Makgadikgadi. Each segment provides a map of the region and describes its geographical conditions, especially as they pertain to water and wildlife. The narrator's voice is too quiet at times, but the details she relates are compelling. If you're serious about visiting the region, Wild Africa lists information on resorts and lodges located in the parks. You also get useful tips regarding gear you might need, health concerns, and currency, plus a nice field guide. So grab your pith helmet and Bermuda shorts and start packing your bags. —*Gabrielle Mitchell*

PARKS

Chobe

The vehicle traffic of tour operators turns Chobe's roads into sand quagmires; four-wheel drive is mandatory. The elephants' daily trek between forage and the river's edge where they drink brings them into close contact with tours. Visitors frequently see sable and kudu as they wander between grazing areas along the river and even higher woodlands in the park. Smaller game such as impala live in the mopane forest at the river's edge. During the quiet midday hours giraffe walk to the Chobe to drink. Lions lie in wait for all of these thirsty animals.

3 OF 5

EXPLORING AFRICA: Rich photographs and QuickTime movies showcase parks in Botswana and Zimbabwe.

Wild Africa: Okavango

Grade: **B+**, Price: $49.95 list; Sumeria; 415/904-0800; www.sumeria.com

READER SERVICE NO. 722

THE VIRTUAL VACATION

IF YOU'RE ONE of those people who can't wait to show off your vacation photos, you'll love this Web site. At **My-Trip.Com**, you can create a home page for your scanned-in or digital images. Simply choose one of the graphic themes, pick the pictures you want to use, and enter captions and descriptions. My-Trip.Com uploads the photos, converts them to an html-friendly format, and presto! You have a site your family and friends can visit any time. You could probably build your own site more cheaply, but My-Trip is a good solution for people too busy to bother with creating a site, or for Net novices who wouldn't touch Web-authoring software with a 10-foot mouse. —*Angela Freeman*

My-Trip.Com

Grade: **B+**; Price: $10 setup, $10 per month; My-Website; www.my-trip.com

READER SERVICE NO. 723

FOR THE GIRLS

IF YOU KNOW a girl between the ages of 7 and 12, you've probably heard about the American Girl dolls—a collection of books, period dolls, and accessories. Now Samantha, Addy, and friends come to life on your PC with **American Girls Premiere**, a CD-ROM with all the tools necessary to create plays featuring the characters. Although the program is fairly easy to use, the tools don't always function as you might expect them to. Players would definitely benefit from taking the time to go through one of the provided tutorials, rather than just jumping in and trying to figure things out as they go. Still, this fun program is sure to delight American Girl fans for hours. —*Roberta Furger*

The American Girls Premiere

Grade: **B+**; Price: $34.99 list; Special Edition Collector's Set $44.99; The Learning Company; 800/227-5609; www.learningco.com

READER SERVICE NO. 724 ■

F Y I

LIKE TO GAMBLE? Better throw your dice on the Internet now. A number of U.S. senators have collaborated to introduce the Internet Gambling Prohibition Act of 1997 to make Net gambling illegal.

SOURCE: GOVERNMENT TECHNOLOGY MAGAZINE

KEEPING UP

Rent-a-Computer

MAYBE THE BEST TIME to buy is never. Have you thought about leasing? Dell has a new personal leasing service (check it out at www.dell.com) that avoids all the problems of obsolescence and frees up your cash for less nerdy pursuits. You pay a monthly lease fee (it varies, but a 24-month lease on a Pentium II-233 will set you back about $106 per month). At the end of the lease, you have three choices: You can exchange the system for the current hot model, keep it a while longer, or buy it outright (at reasonable market value). Now you really can have a new home computer every two years.

Get Rid of Junk E-Mail

I GET SO MUCH JUNK e-mail that the important stuff often gets lost. You probably do too. For five bucks, there's an easy way to get rid of it. A new service called Boxfree (members.aol.com/boxfree/index.html) will take you off as many as 3200 e-mail and bulk mail lists. Dial 900/336-9970; $4.95 will be billed to your phone number, and the service will give you a PIN. Then e-mail your PIN, name, address, and the e-mail address you want removed to boxfree@aol.com, and you'll be taken off e-mail lists.

Best to Be Paranoid

TROJAN HORSE programs on America Online have become such a problem that you've probably already heard your mother say, "Take a coat, and don't download e-mail from anyone you don't know." If your mother isn't Internet savvy, I'll fill you in: You get mail claiming you need the attached file for some (usually prurient) reason. What the file actually does is grab your password and e-mail it to the hacker, who sent you the file. AOL's new Download Sentry sets off an alarm whenever you try to download an e-mail that contains the kind of attachments associated with Trojan Horse programs. Not an altogether elegant solution, but the online service says it's working on others. —Christina Wood

ILLUSTRATIONS: MARK MATCHO

"I COULDN'T BELIEVE MY EYES!"

If it weren't for Family Tree Maker,™ I would never have found my family

Using Family Tree Maker, Diana found her great-great grandparents Hannah & William Hunt Wilson.

Dear Family Tree Maker,

I became interested in genealogy because I never knew my ethnic heritage. The only ancestor name and location I knew of was that of my great-great grandfather, William Hunt Wilson who lived in Oregon.

I then decided to purchase a genealogy program, and chose Family Tree Maker because of the FamilyFinder™ Index. I went home, loaded the program, did a search in the FamilyFinder Index using my great-great grandfather's name, and it referenced a World Family Tree™ CD.* I couldn't believe my eyes!

I found the name "William Hunt Wilson" on the CD. The family tree was huge — hundreds of names! My name was not there, so I decided to contact the tree's contributor to let her know that I found the connection. I left a message, and that night, I received the long-awaited call. The contributor, who is also my cousin, was screaming on the phone because she could not believe she had found me. I was part of a "long lost leg" that the family had not heard of for over 50 years! We laughed, we cried, and talked all night. And now, we have contact every day — either by phone or by e-mail.

A family reunion is scheduled to take place this Fall, thanks to Family Tree Maker. I never would have found my family if it weren't for the program.

Thank you!

Diana Yashar

San Jose, CA

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- Print beautiful family trees, books & reports
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Awards won by Family Tree Maker™ Deluxe Edition II, the previous version.

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PC WORLD

TOP 5 HOME PCs

	SYSTEMS	Street price (8/15/97)	Overall rating	PC WorldBench score/rating	Reliability/ service rating	Setup rating	Comments	Reader service number
1	Gateway 2000 G5-166SE 800/846-2000 www.gateway.com	$1599	90	218/ very good	fair/ best	outstanding	**FEATURES:** Pentium MMX-166, 16MB of SDRAM, 2GB hard drive, 16X CD-ROM drive, 15-inch monitor, 56-kbps modem, Canon BJC 240 color bubble jet printer. Includes Microsoft Office 97 Small Business Edition, Encarta 97, Greetings Workshop, Quicken, and Pod. **PRO:** Bargain, includes color printer. **CON:** Lacks power for high-end titles.	741
2	Dell Dimension XPS M233s 800/388-8542 www.dell.com	$2379	90	242/ outstanding	best/ best	fair	**FEATURES:** Pentium MMX-233, 32MB of SDRAM, 4.3GB hard drive, 16X CD-ROM drive, 17-inch monitor, 33.6-kbps fax-modem, Iomega Zip drive. Includes Microsoft Office 97 Small Business Edition, and Encarta 97 or Bookshelf 97. **PRO:** Reasonably priced, meaty hardware bundle, very fast. **CON:** Limited software.	742
3	Gateway 2000 G5-200M 800/846-2000 www.gateway.com	$1879	88	239/ outstanding	fair/ best	outstanding	**FEATURES:** Pentium MMX-200, 32MB of RAM, 3.1GB hard drive, 24X CD-ROM drive, 17-inch monitor, 56-kbps fax-modem. Includes Microsoft Office 97, Encarta 97, Pod, Third Dimension, Ultimate Human Body 2.0, Quicken SE, and Money 97. **PRO:** Fairly cheap. **CON:** Second-slowest system on chart, mediocre reliability.	743
4	Micron Millennia Mme with Fusion 3D 888/634-8799 www.micron.com	$2689	85	241/ outstanding	good/ best	good	**FEATURES:** Pentium MMX-233, 32MB of RAM, 3.2GB hard drive, 24X CD-ROM drive, 17-inch monitor, 56-kbps fax-modem, Iomega Zip drive. Includes Microsoft Office 97 Small Business Edition, Adobe PhotoDeluxe, AH-64D Longbow, Mercenaries 3D, and Command and Conquer. **PRO:** Very fast. **CON:** Slightly on the expensive side.	744
5	Micron Millennia XRU 888/634-8799 www.micron.com	$3999	82	263/ outstanding	good/ best	outstanding	**FEATURES:** Pentium II-266, 64MB of RAM, 6GB hard drive, DVD/20X CD-ROM drive, 19-inch monitor, 56-kbps fax-modem, Iomega Zip drive, Sidewinder joystick, 3D video card with 4MB of RAM. Includes Microsoft Office, Adobe PhotoDeluxe, and Silent Steel (DVD). **PRO:** Speed monster, beefy hardware. **CON:** Extremely expensive.	745

Best Buy — All products: 909

HOW WE TEST The overall rating is based on reliability and service (40 percent), price (20 percent), PC WorldBench performance (20 percent), setup (10 percent), and extra features (10 percent). Reliability and service ratings are based on results of *PC World*'s Reliability and Service survey.

GATEWAY 2000 BLASTS ITS WAY to the top of the chart this month with its brand-new G5-166SE. And it's a fabulous bargain. The Gateway G5-166SE sports a Pentium MMX-166 CPU, 16MB of SDRAM, a 2GB hard drive, a 16X CD-ROM drive, a 15-inch monitor, and Canon's BJC 240 color bubble jet printer.

It's ideal as a basic home office or family PC, but don't expect to run demanding games or to crack CIA codes—it's got the lowest PC WorldBench score in the Top 5.

Dell's reign at the top is finally over—for this month at least. For 11 months in a row, Dell ranked number one with its Dimension PCs. But Gateway's G5-166SE at $1599 bumps Dell to second place.

Second place isn't chicken feed, though; the Dell Dimension XPS M233s is a speedy Pentium MMX-233 system for a reasonable $2379. Software is limited to Microsoft Office 97 Small Business Edition, and Encarta 97 or Bookshelf 97. It's an excellent choice as a powerful home office machine.

Also from Gateway is the $1879 G5-200M, in third place. This Pentium MMX-200 machine is beefier and faster than its Best Buy cousin. If you're looking for a powerful home office machine that can handle high-end multimedia titles, this could be the one.

GATEWAY'S G5-166SE plus printer costs a mere $1599.

In fourth place is Micron's Millennia MME, which is on the pricey side at $2689. It's very fast and it comes with a Pentium MMX-233 CPU, an Iomega Zip drive, and a bunch of games. This is a suitable system for home office tasks and family fun.

Micron's Millennia XRU is at number five for the second month, and it's still the fastest home PC we've ever tested. And at $3999, it's also the most expensive. A gamer's dream, the XRU offers a Pentium II-266 CPU, 64MB of RAM, a DVD/20X CD-ROM drive, and a *19-inch* monitor—superb for watching those DVD movies!

—*Kirk Steers*

Kirk Steers is a contributing editor for PC World. *Testing performed by Ulrike Diehlmann of the PC World Test Center.* ■

EDITOR'S NOTE

SINCE WE LAUNCHED the Top 5 Home PCs in June 1996, this section keeps growing in popularity. In response to our readers, we're expanding the Top 5. Tune in next month for the new Top 10 Home PCs, where we'll cover the Top 5 power and Top 5 budget systems.

ILLUSTRATION: JEFFREY PELO

Speed and power are
about technology
not hype

VELOCITY 128™

- 128-bit 2D/3D multimedia accelerator
- 4MB of 100MHz SGRAM memory
- 1.6 Gigabyte/sec data transfer rate
- 230MHz integrated RAMDAC
- Video out for connection to TV's
- 5 GFLOP setup & rendering engine
- 100 Million rendered pixel/sec fill rate
- 15 Billion pixel operations/sec
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- Vertex and texture caching
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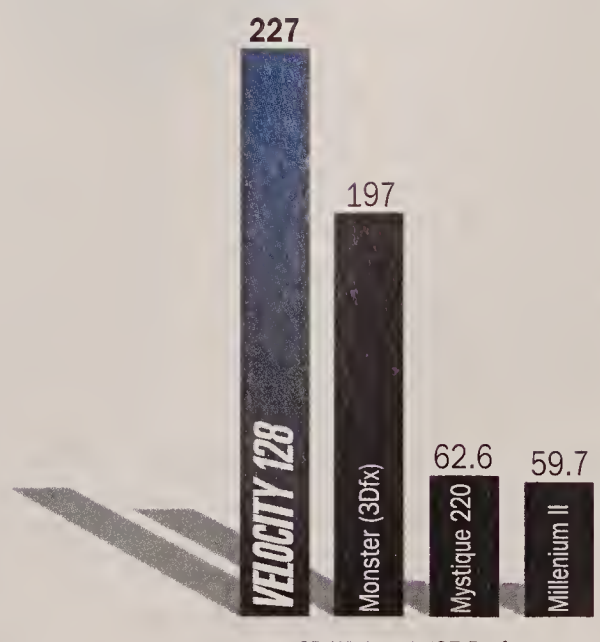

3D Winbench '97 Performance†

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Roasting Microsoft on an Open Fire, Part II

OKAY, YOU BE lookout. If you see anyone from Microsoft, give me the high sign. I'm going to drag the company over the coals again.

Let's start with Windows 95. First, a declaration: I use Win 95, I think it's terrific, and I recommend an upgrade to anyone using Windows 3.*x*. (I'll bet that's the *only* quote Microsoft uses from this column.)

But as much as I like Windows 95, it has some problems that drive me nuts. Worse, with all of Microsoft's money and resources, the company arrogantly chooses to ignore these problems. (Maybe the Federal Communications Commission should demand that Microsoft implement a recall program like car makers do.)

When I upgraded to Windows 95, I hoped it would do a better job of uninstalling programs than its predecessor. But its uninstall tool is, to put it mildly, rudimentary. For Windows 95 to rid your PC of an application, the program must have been installed through Win 95's Add/Remove Program tool. Most programs comply with this rule; unfortunately, not all do. Older Windows 3.*x* apps (and worse, DOS programs) can be a nightmare to remove, scattering leftover body parts all over your hard drive.

WHO'S GONNA CLEAN THIS UP?

JUST AS BAD, the Add/Remove Program tool doesn't always work correctly. The biggest hassle is the trail of muddy DLL footprints it leaves behind when trying to uninstall a program. For example, when removing an application I'll often get a dialog box informing me that a DLL it uses may be shared with another program, and inquiring whether I want to delete it. (Asking *me* for advice? Hello? Hey, Bill, tracking DLLs is the job of an operating system, not *moi*.)

> Microsoft has two deeply hidden secret weapons to help keep your system from taking a dive.

So I don't rely on Windows 95 to uninstall my programs. Instead I use Quarterdeck's CleanSweep. Whenever I install a new application, CleanSweep automatically begins logging the installation activity. When I'm ready to remove an application, CleanSweep adeptly handles the chore because it knows the program's location, including each and every DLL. It's not a perfect utility, but for $40 it goes far beyond Windows 95's capabilities.

STEP UP TO THE REGISTRY

DOES WINDOWS 95 sometimes just crash on you? Maybe because you tilted your head, or the dog barked? Get this: Microsoft has two deeply hidden secret weapons to help keep your PC from taking a dive.

When your PC crashes, it's probably not your fault (and listen, not *mine* either). More likely it's caused by stray, duplicate, or outdated DLLs colliding with each other. Or it may be a wayward Registry entry.

Win 95 stores tons of information about your system in a revered, mysterious couple of files called the (pause here for a sec, and lower your voice) *Registry*. The Registry is the most complicated thing I've seen. It's way more complicated than even my grandmother's recipe for strudel.

RegEdit, a program for tweaking the Registry, comes on the Windows 95 CD-ROM. But you'd have to be crazy to use it; not even the bravest techno-dweebs I know would dream of editing the Registry. (To avoid litigation and late-night tech support calls from my mom, I won't even tell you where it is.)

Have you ever heard of Microsoft's free Office Upgrade Wizard? No surprise if you haven't. It's well hidden within Microsoft's Web site. The Upgrade Wizard is valuable, and I recommend you use it. It found, among other things, outdated PowerPoint viewers—about 24MB worth—on my system and removed them. I could get rid of all the files not needed by the current Office 97 version, remove all the files installed by previous versions, or remove only some files. I chose to move the files to a temporary directory. The question is, Bill, why weren't these files removed when I installed Office 97?

You can grab a copy of the Upgrade Wizard by visiting PC World Online.

Next month? Another rant, and programs to make Office 97 snap, crackle, and pop.

CleanSweep

$40 street; Quarterdeck; 800/683-6696, 813/523-9700; arachnid.qdeck.com

READER SERVICE NO. 740

Office Upgrade Wizard

Free; Microsoft; 206/882-8080; www.microsoft.com

Find files from this article at www.pcworld.com/files. Contributing Editor Steve Bass is a licensed marriage and family therapist and president of the Pasadena IBM Users Group. See page 14 for contact information. ■

ILLUSTRATION: MARK MATCHO

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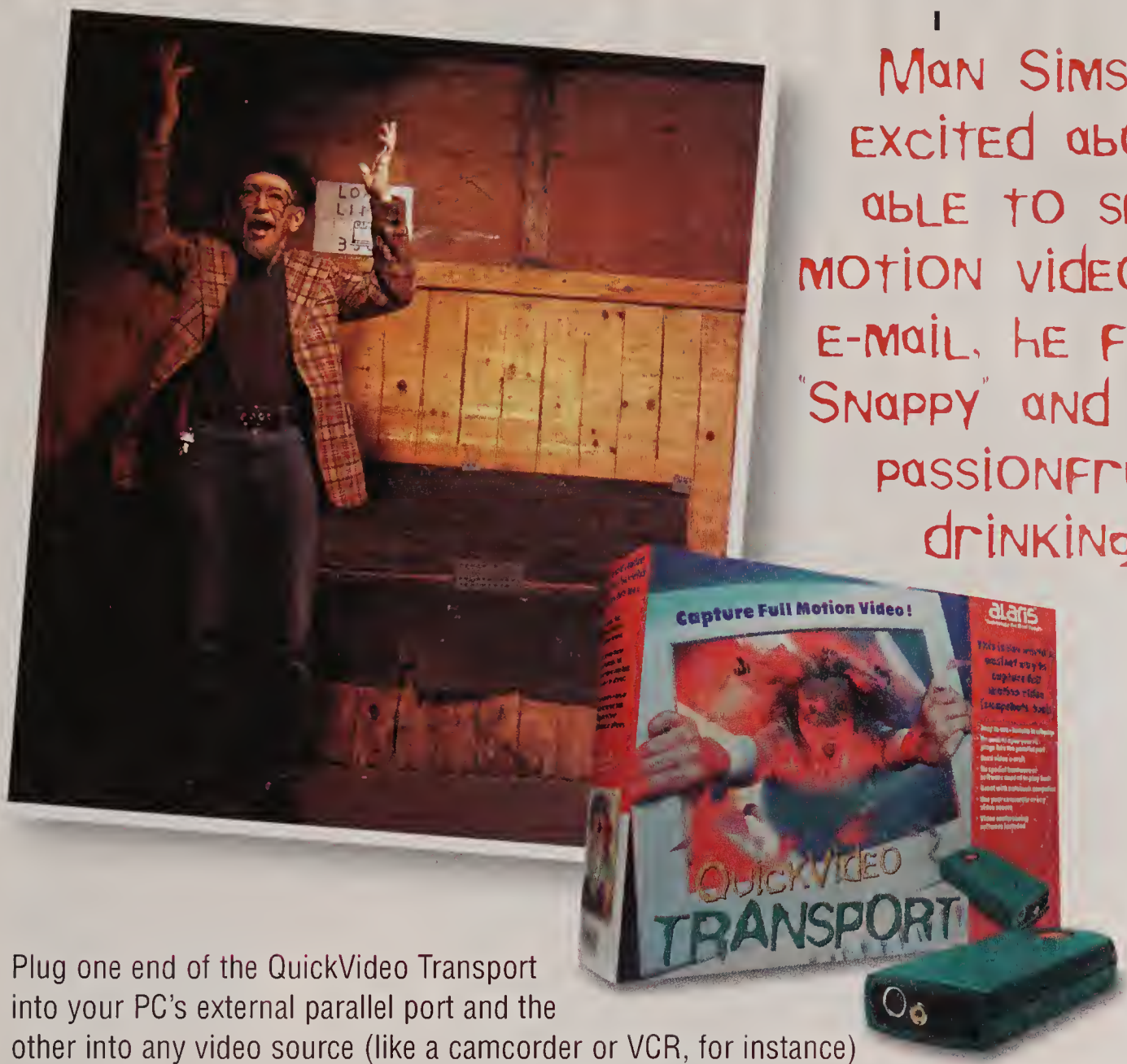
Man Sims was so excited about being able to send full motion videos through e-mail, he flushed his "Snappy" and went on a passionfruit soda drinking binge.



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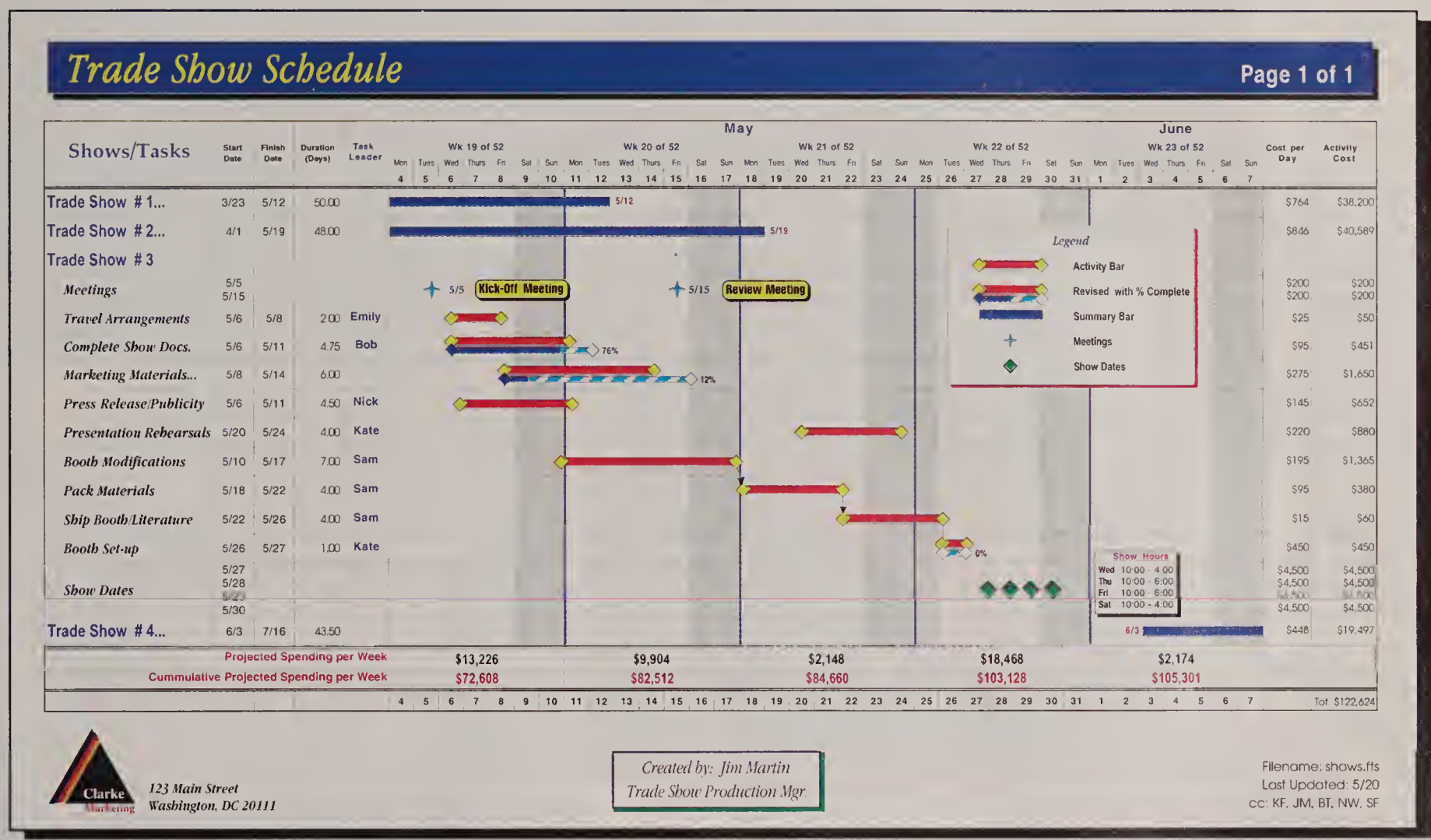

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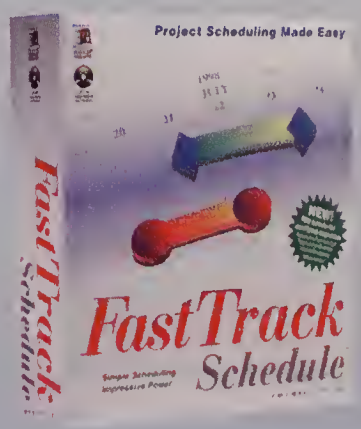

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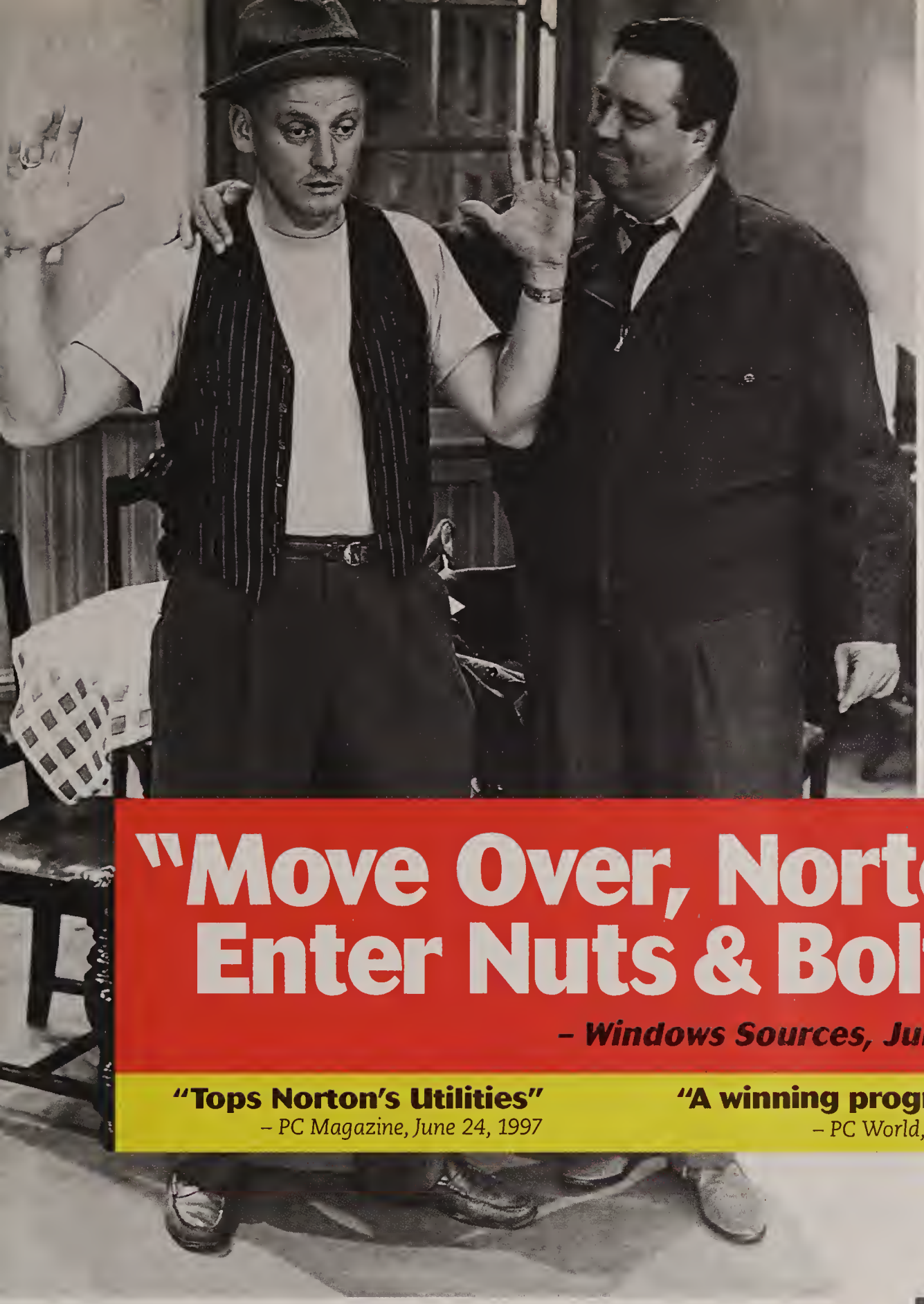

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Provides Detailed System Info	YES	YES
Emergency Rescue & Recovery	YES	YES
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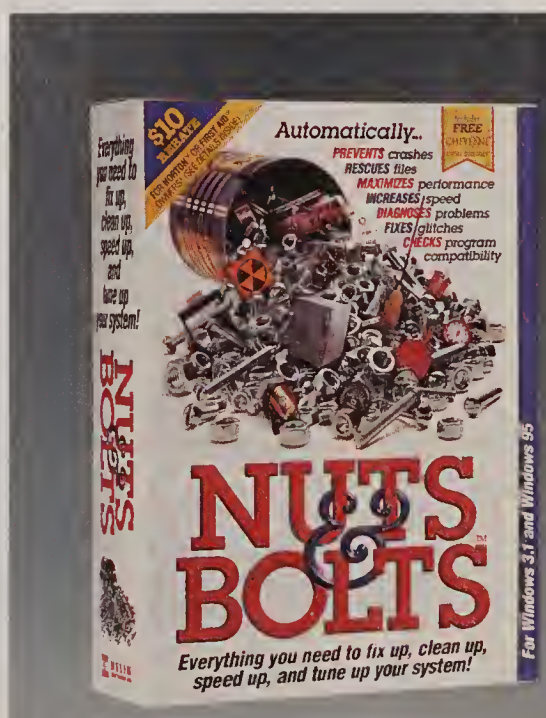

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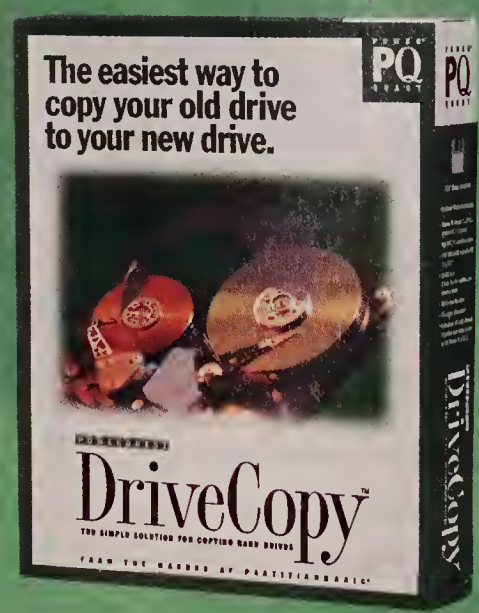

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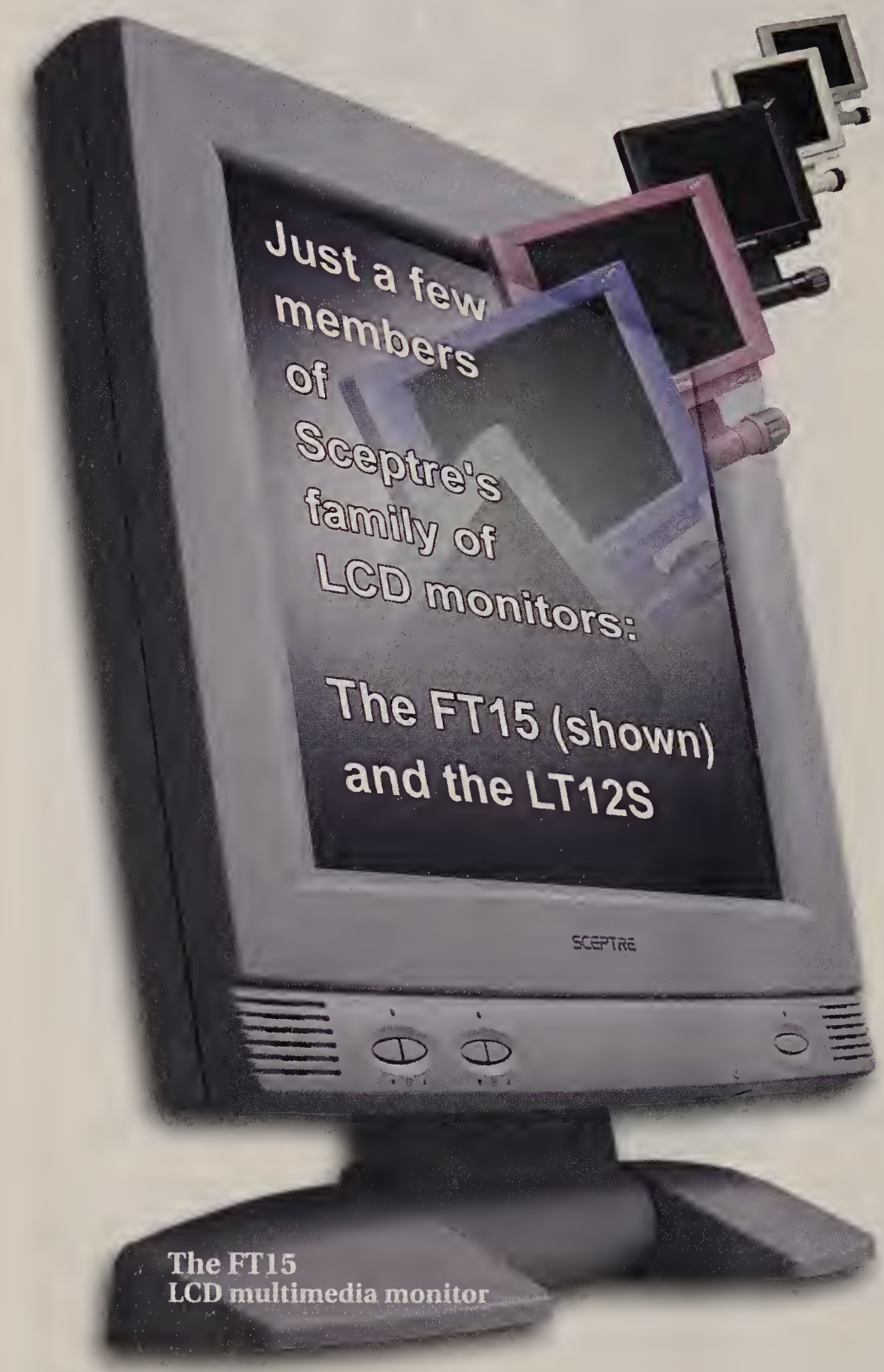

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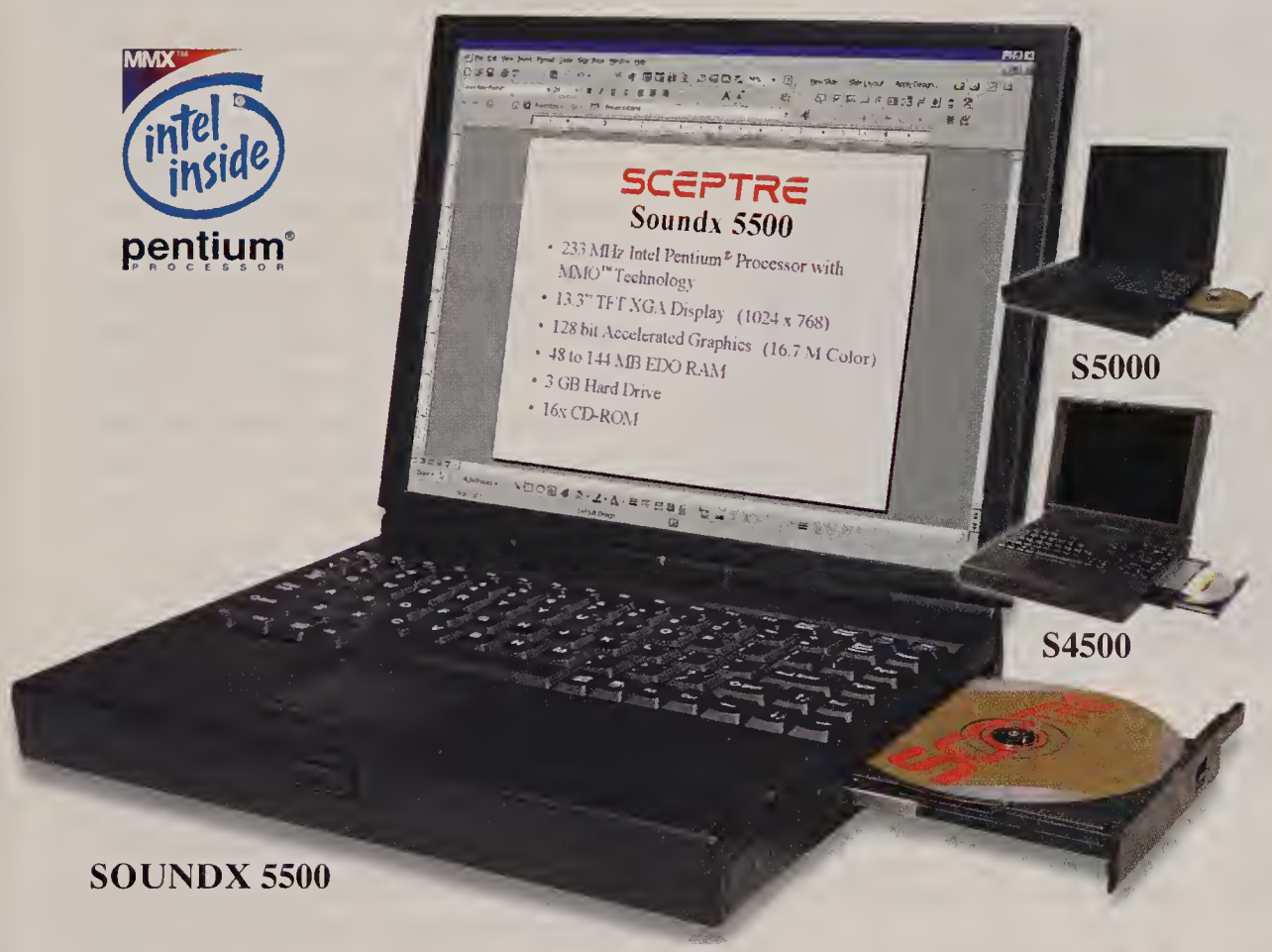

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HERE'S HOW

ANSWER LINE

How Many Bad Pixels Are Too Many?

RECENTLY A FRIEND bought a new Toshiba laptop and discovered that the active-matrix LCD screen had four bad pixels. When my friend complained to the store about the defects, the retailer stated that the industry-standard level of acceptable bad pixels is 12, and that Toshiba accepts up to 25! My friend had the screen replaced, but the new one still had two bad pixels. Are flawed screens really this common?

Vince Bello, Norwalk, Connecticut

IT IS DIFFICULT to get a perfect LCD screen, especially an active-matrix model. But there is no industry-standard "acceptable" number of bad pixels. Rather than throwing out a large proportion of imperfect displays—thus driving up the price of all screens—manufacturers consider a limited number of bad pixels acceptable. But that doesn't mean *you* have to.

Bad pixels are locked in either the "on" (bright) or "off" (dark) state. You might not notice a few dark pixels scattered around a screen's periphery. But a clump of bright pixels smack-dab in the middle of your expensive screen will drive you nuts.

Toshiba's official policy is that up to 12 "nonconforming" pixels is acceptable. Grouping plays a role in the policy as well—fewer than 12 bad pixels concentrated in the center of the screen could also be grounds for replacement. Other companies have more customer-friendly policies. Dell will replace screens with more than 10 bad pixels, or with more than 4 in an area the size of a quarter. Gateway 2000's limit is 7, period.

If you want a perfect screen, buy your laptop from a store rather than through mail order, and check it carefully. If the salesperson won't let you choose the best system in stock, try a store that will. If you buy from a mail-order outfit, you can always return your new laptop within the money-back period, then order another one. But if you have a system with fewer bad pixels than the manufacturer's limit, there's a chance the second screen will be worse. In any case, use a credit card and choose a company with a 30-day return policy and no restocking fee.

WHATSAMMATA, UART?

I RECENTLY BOUGHT an external modem capable of speeds up to 33.6 kilobits per second. But when I try to surf the Web at 28.8 kbps, I can't maintain a connection to my Internet service provider. The ISP's engineer tells me that my serial port's UART chip is too slow to handle this speed and disconnects me.

DOS's Microsoft Diagnostics utility, or MSD, reports that I have an 8250 UART, and I've been advised to install a new I/O board with a faster UART. The server I dial in to supports speeds up to 33.6 kbps, and the phone line seems okay. Will a faster I/O board help me?

Osama Goussous, Amman, Jordan

ALMOST CERTAINLY. An 8250 universal asynchronous receiver-transmitter chip is capable of a maximum speed of 9600 bits per second. It's likely that what you really have is a 16450 UART, which most detection software—including MSD—misidentifies as an 8250 (see **FIGURE 1**). The MSD utility comes with MS-DOS and is also available on the Windows 95 CD-ROM in the Other\Msd folder.

The 16450 UARTs are capable of 19.2-kbps serial port speeds—adequate for a 14.4-kbps modem but not for anything faster. For speedier connections, you need a 16550A (or AF or AFN) UART, which

By Scott Spanbauer

ILLUSTRATION: JEFF BERLIN

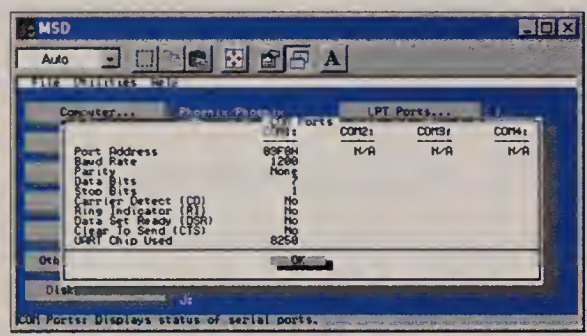


FIGURE 1: IF MSD REPORTS AN 8250 UART, upgrade your ports to use fast external modems.

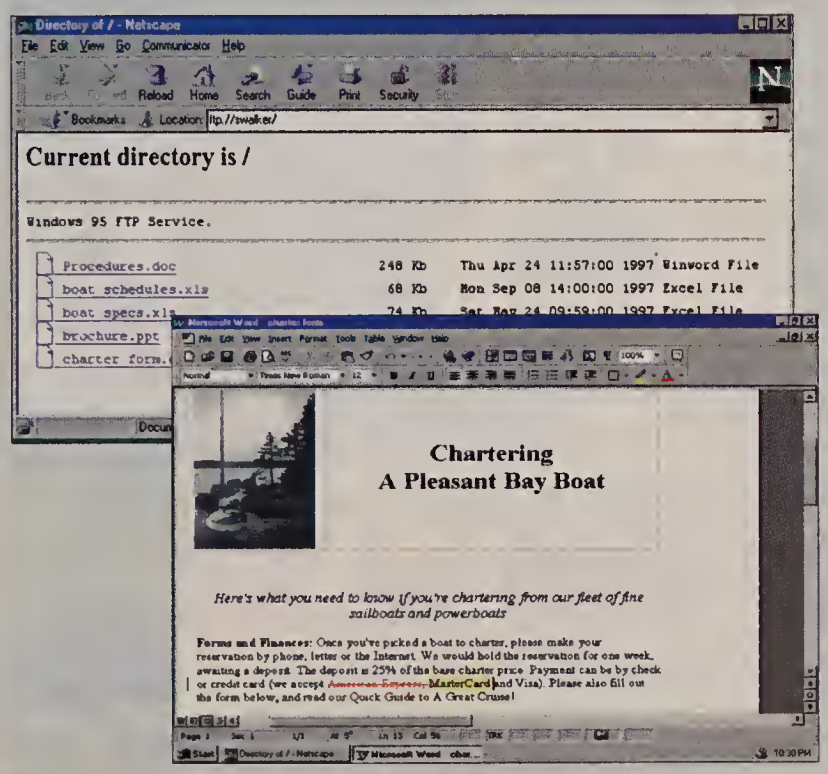
transmits at speeds up to 115.2 kbps.

You can disable or remove your current serial ports and install a new I/O board that uses 16550A UARTs (which sell for as little as $20) or another type that emulates the 16550A. (Among those, the 16650 transfers data at up to 230.4 kbps, and the 16750 at up to 921.6 kbps, but only ISDN terminal adapters and a few specially modified analog modems can currently take advantage of these speeds.)

Other factors can cause disconnection from the server, notably incoming calls on a line with Call Waiting. Make sure you disable Call Waiting before your modem dials. You can do this by using the appropriate settings in your communications software or by prefacing the modem dialing string with ***70** or **1170** (check with your phone company for the exact code).

Share Documents on Your Personal Web Server

WANT AN EFFICIENT way to share frequently updated documents with your workgroup? Check out Microsoft's Personal Web Server, available free at www.microsoft.com/ie. This program lets you set up a simple intranet by running a basic Web server on any Windows 95 PC. For example, you can post common documents on the program's FTP server: Double-click on any file created by a Windows 95 application, and the document will pop up ready for updates.



BANISH START-UP DRIVER ERROR

EVERY TIME I START UP Windows 95, it displays the following warning: 'The Windows Registry or system.ini file refers to this device file, but the device file no longer exists'. The message then lists the name of the device driver. I searched through the system.ini file, and it contains no reference to the missing device driver. How do I tell Windows' Registry to stop trying to load the device file?

Elias El Hossari, Carthage, Texas

I'VE HAD THIS same problem. It occurs when you delete a device driver from your hard disk without uninstalling it. The error message also suggests that you reinstall or uninstall the application to solve the error. However, you might not want or be able to do either (for example, if you no longer have the program disks, or if the application lacks an uninstall feature).

To stop the error messages from popping up, you must delete the Registry entry (called a *key*) that loads the device driver. First back up the following files in your Windows directory: system.dao, system.dat, user.dao, and user.dat. Choose *Start•Run* and type **regedit.exe** in the Open box to launch Windows' Registry Editor. Press **<Ctrl>-F**, and in the 'Find what' box, type in the name of the errant driver, without the .vxd extension. Now make sure only *Keys* is checked in the 'Look at' section, and click *Find next*. You should land on a folder under HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\VxD. Triple-check that you highlighted the correct Registry key, then press **<Delete>** and exit the Registry Editor.

CAN I UNINSTALL WINDOWS NT?

I HAVE WINDOWS 95 and NT 4.0 installed to dual-boot on my PC. I am thinking about uninstalling NT 4.0, but I remember reading somewhere that simply deleting it from the system would ▶

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leave me with a PC that doesn't boot. Is there a procedure to safely delete NT, or can I just delete the NT directory?

David R. Gorton, Okinawa, Japan

WINDOWS NT installs its own bootstrap program—the one that lets you choose between Windows 95 and NT at start-up. Just deleting Windows NT's files won't stop the bootstrap program from attempting to load. You could set Windows 95 as the default operating system in the Windows NT Control Panel's System applet. Then when you boot, the bootstrap program will default to Windows 95.

The best thing to do, though, is either reinstall Windows 95 (which will replace NT's bootstrap program with Windows 95's) or use DOS's Sys command to replace the bootstrap program. To do the latter, create a Windows 95 Startup floppy disk: Select *Start•Settings•Control Panel,* double-click the *Add/Remove Programs* icon, click the *Startup Disk* tab, and click the *Create Disk* button. Boot with it, then issue the command **sys c:**. Remove the disk and restart. Windows 95 should load normally. Now you can delete the NT directory tree (usually \winnt) and the files it leaves in the root directory: ntldr, ntdetect.com, boot.ini, and pagefile.sys.

One last tip: If you installed Windows NT on an NTFS logical drive in your hard disk's extended partition (in other words, on any partition other than c:), you won't be able to remove the partition by using the fdisk utility that comes with Windows 95 or MS-DOS. It will just tell you there aren't any logical drives to delete—even though there are—and you won't be able to delete the extended partition until you delete the logical drives it contains.

You can delete the logical drive with an NTFS-compatible utility like PowerQuest's PartitionMagic, then use fdisk to create a new FAT partition. Or you can reinstall NT on the first partition and then use its own tools to remove the NTFS logical drive in the extended partition.

• **PartitionMagic $70 street; PowerQuest; 800/379-2566; www.powerquest.com**

READER SERVICE NO. 755

COLUMNIST GETS REBOOT

ANSWERING READER questions for *PC World* has been a thrill and an honor, but it's time for me to move on. In a career twist we couldn't have pulled off deliberately if we'd tried, former senior associate editor and now contributing editor Lincoln Spector will take over *Answer Line.* Meanwhile, I'll be filling Lincoln's old job at *PC World.* Please continue sending your questions, tips, and advice to answer @pcworld.com. Thanks again for all the questions, answers, appreciation, and criticism. May all your software be bug-free and all your hardware cutting-edge.

Answer Line *welcomes questions and pays $50 for published items. Scott Spanbauer is a senior associate editor for* PC World. *See page 14 for contact information.* ■

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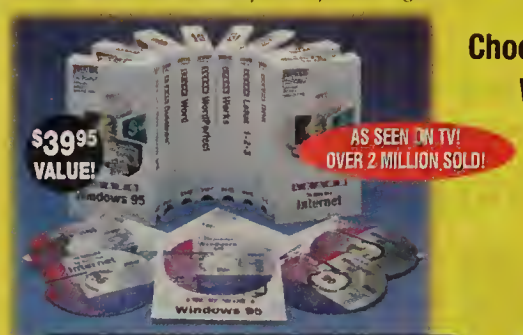

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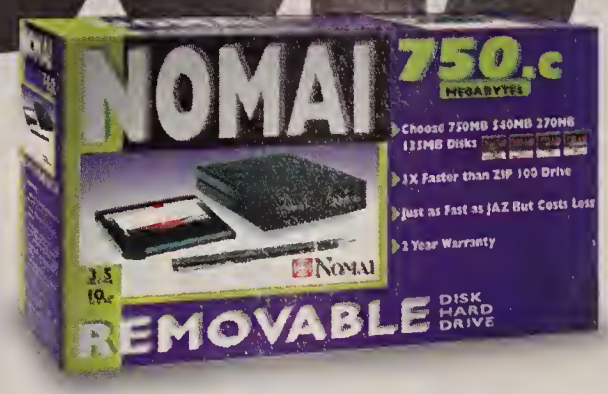

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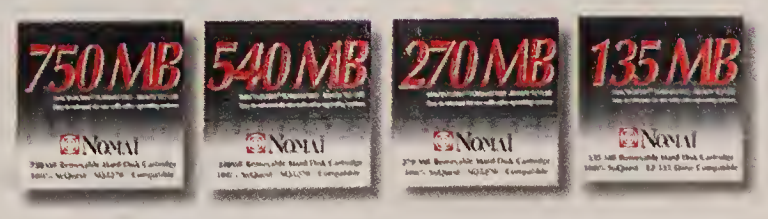

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Chat on Your Net for Free

I RECENTLY HAD a 24-computer network installed in my office. How can I send messages to other computers through the network without using the Internet or an intranet?

Eytan Bensoussan, Montreal

E-MAIL PROGRAMS work fine with conventional networks. But if you blew your software budget installing the network, you do have a couple of simple options available: WinPopup and WinChat. Both of these accessory programs come with Windows 95 and Windows for Workgroups 3.11.

If you can't find the winpopup.exe or winchat.exe files on your computer, you'll have to install them from your Windows CD-ROM or floppies. If you're using Windows for Workgroups, insert the CD or the disk that contains winpopup.ex_ or winchat.ex_. Then expand the file using the DOS expand.exe utility in your hard disk's Windows directory (just type **expand** from a DOS window and follow the prompts). Repeat for winpopup.hl_ or winchat.hl_ if you want the help files (winpopup.hlp or winchat.hlp).

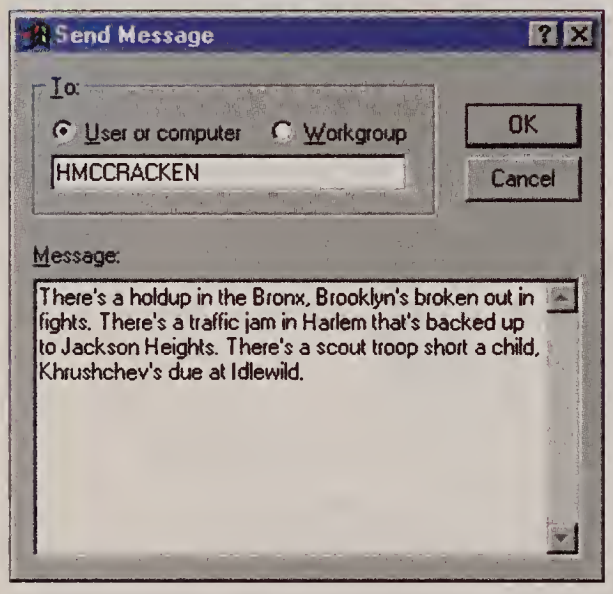

FIGURE 1: EXCHANGE MESSAGES with individuals or workgroups using the free WinPopup accessory.

To install WinPopup in Windows 95, choose *Start•Settings•Control Panel,* double-click the *Add/Remove Programs* icon, click the *Windows Setup* tab, select *Accessories,* click *Details,* check the box next to *WinPopup,* and click *OK* twice to close the dialog boxes. Then follow the prompts you see on screen. To install WinChat, just copy the contents of the Other\Chat folder from your Windows 95 CD-ROM into your Windows folder.

With WinPopup, the main trick is to make sure all the people you want to communicate with have the program running on their computers. The easiest way to do that is to find winpopup.exe in Explorer or File Manager (look in the Windows directory) and drag it to the Windows\Start Menu\Programs\Startup folder (in Windows 95) or to Program Manager's Start-Up group window (in Windows for Workgroups 3.11). This automatically creates a Shortcut or program icon and ensures that WinPopup will launch whenever Windows starts. Users can set their own options: Choose *Messages•Options* and decide whether the computer should make a sound when a message arrives, whether the WinPopup window always stays on top, and whether a dialog box pops up when a message arrives.

The rest is pretty easy: To send a message, click the *Send* button or choose *Messages•Send;* then type in the computer name of someone on your network (see **FIGURE 1**). To send a message to an entire workgroup, select the *Workgroup* option and type the name of the group.

If you don't know your workgroup or computer name, in Windows 95 just double-click the *Network* icon in the Control Panel, then click the *Identification* tab to see these details.

If you're using Windows for Workgroups, you can click *Browse* (and, if necessary, the *Browse* >> button in the Select Computer dialog box) to choose your recipient from a list of available computers. Then click *OK.* (This works only for selecting a computer; however, you can write down the listed user and workgroup names and type them into the To: box.) Type your message and click *OK.* Windows tells you if your message was sent successfully.

When you receive any messages, it pays to clear them as soon as you've read them; just click the *Delete* icon or choose *Messages•Discard* or *Messages•Clear All.* Otherwise, subsequent messages won't appear in the message window (although the window will still pop up and make a sound, depending on the options you've chosen). To see new messages while older ones are still in the message window, click the *Next* button until you get to the last message. All messages are deleted when you exit WinPopup anyway, so don't get too attached to them.

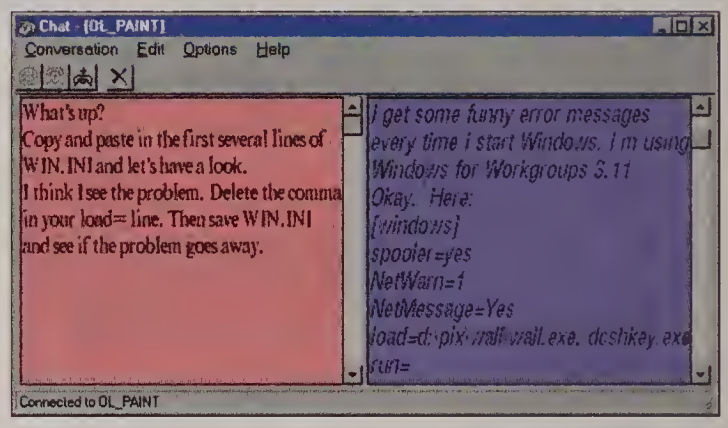

FIGURE 2: GET THE ADVANTAGES OF WINPOPUP and phone at once through live conversation using WinChat.

For more complex and instant interaction with someone on your network, try WinChat. It lets you and another user "converse" by typing messages back and forth in a split-screen window. WinChat is like a telephone—it's useful only if the other party answers. And while it will never replace your regular phone, WinChat comes in handy with employees who are hard of hearing or for sharing complicated text items (like computer settings) with a remote user, as in **FIGURE 2**.

Unlike WinPopup, WinChat doesn't need to be running on your recipient's machine when you "dial" up. By default, placing a WinChat call starts the program on the recipient's computer as a minimized icon and a ringing sound effect. If you don't want to be bothered by ▶

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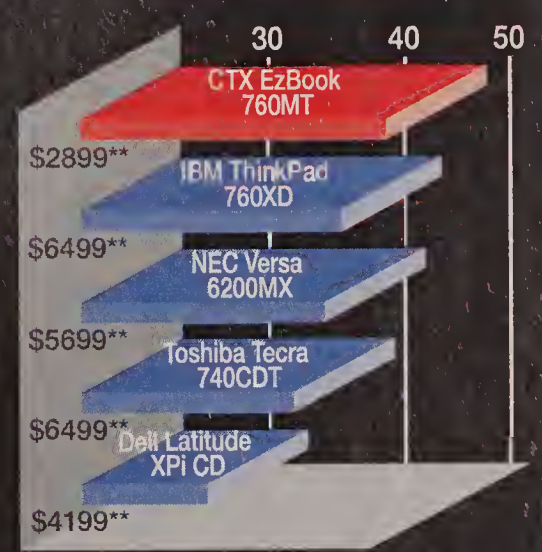

[1]Mobile Computing and Communications, July '97. Performance tests based on the System Information benchmark in Symantec's™ Norton® Utilities for Windows® 95—a suite of 32-bit tests that rate how a system runs tasks commonly found in Windows applications.
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incoming chats, however, you can choose *Options•Preferences*, uncheck *Autostart Chat*, and click *OK*. You can still initiate chats, but you can't receive them.

To place a call, click the *Dial* button or choose *Conversation•Dial*. Type the name of the computer you're calling—no user or workgroup names this time. (Again, Windows for Workgroups gives you a Browse button plus a history list.) The person initiating a call can repeat this process to add more people to the conversation.

To answer a call, simply maximize the WinChat icon; if the WinChat window is already open when you receive a call, click the *Answer* button or choose *Conversation•Answer*. Then just start typing. Your messages appear in your windowpane, and the caller's appears in the other. If the caller adds another person to the conversation, the new participant will see all the previously typed messages (each new caller adds a pane to your screen). However, you can clear your own pane by clicking the *Clear* button or choosing *Edit•Clear All*. To terminate a call, either click the *Hang Up* button, choose *Conversation•Hang Up*, or just exit WinChat. The chat material stays on screen until you exit, answer a call, or initiate another call.

You can also customize your chats: Set a custom background color for your pane by choosing *Options•Background Color*, specify a font with *Options•Font*, and indicate whether panes should tile vertically or horizontally by selecting *Options•Preferences*. And if you don't like the other party's font and background color, you can change them in your view.

ANNOTATE YOUR HELP

IF YOU LIKE the tips you read in *PC World* or enjoy the ones you've discovered on your own, you may be looking for a handy way to store them all. A quick and easy method is to piggyback your tips onto related items in Windows' own Help system. Although you can't edit Windows Help or search for your tips, you can add information in the form of an annotation.

For example, if you use the WinPopup utility to send messages to others on your network, you may want easy access to a list of available computer names (see "Chat on Your Net for Free"). In that case, the Help topic on sending a message would be a handy place to keep those names.

Here's what to do. For the example above, start WinPopup in Windows 95 and select *Help•Help Topics*, then double-click *To send a pop-up message*. With the proper Help topic in front of you, click the *Options* button or right-click in the Help window, then choose *Annotate*. Type the information you want to add in the Annotate dialog box—in this case, the network names of the computers you send messages to (see **FIGURE 3**). When you're done, click *Save*. The Annotate window will close, and you'll see a paper-clip icon next to the topic title in the Help window.

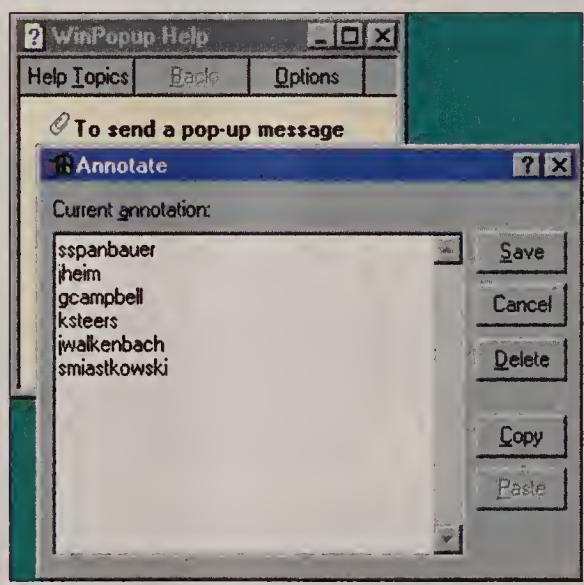

FIGURE 3: ADD YOUR OWN TIPS OR NOTES to any Windows Help file with the Annotate feature.

In Windows 3.*x*, select *Help•Contents* in any application, find the topic you want to annotate, and select *Edit•Annotate*. Enter your comments in the Annotate dialog box, then click *Save*.

If you see a great tip in PC World Online, you could select the information in your Web browser, copy it to the Clipboard, and then find the related Help topic and paste the tip into that topic's Annotate dialog box.

Whenever you want to review the information you've added, just return to the Help topic and click the paper-clip icon.

In Win 3.*x* you have a great way to keep track of this new information—bookmarks. While the annotated topic is still in the Help window, choose *Bookmark•Define*. Type a description that will help you remember the new information; for the previous example, you might type **Network computer names**. The next time you want to find your personalized help, just open the appropriate Help file to any topic and choose your bookmark name from the Bookmark menu. Unfortunately, many Windows 95 Help windows do not include this option; the Help system for Microsoft's free Tweak UI utility is a happy exception.

CLUE IN TO CALCULATOR

WINDOWS CALCULATOR can be a handy companion for quick (and not-so-quick) calculations. Its real oomph comes when you switch to scientific mode (choose *View•Scientific*). But what do all those buttons mean? If you're a bit confused or simply need a little memory jog, help is just two clicks away: Right-click on any key in the ▶

WINDOWS TOOLBOX

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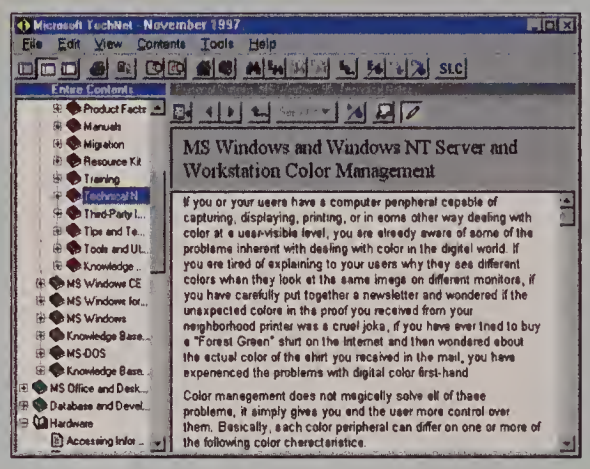

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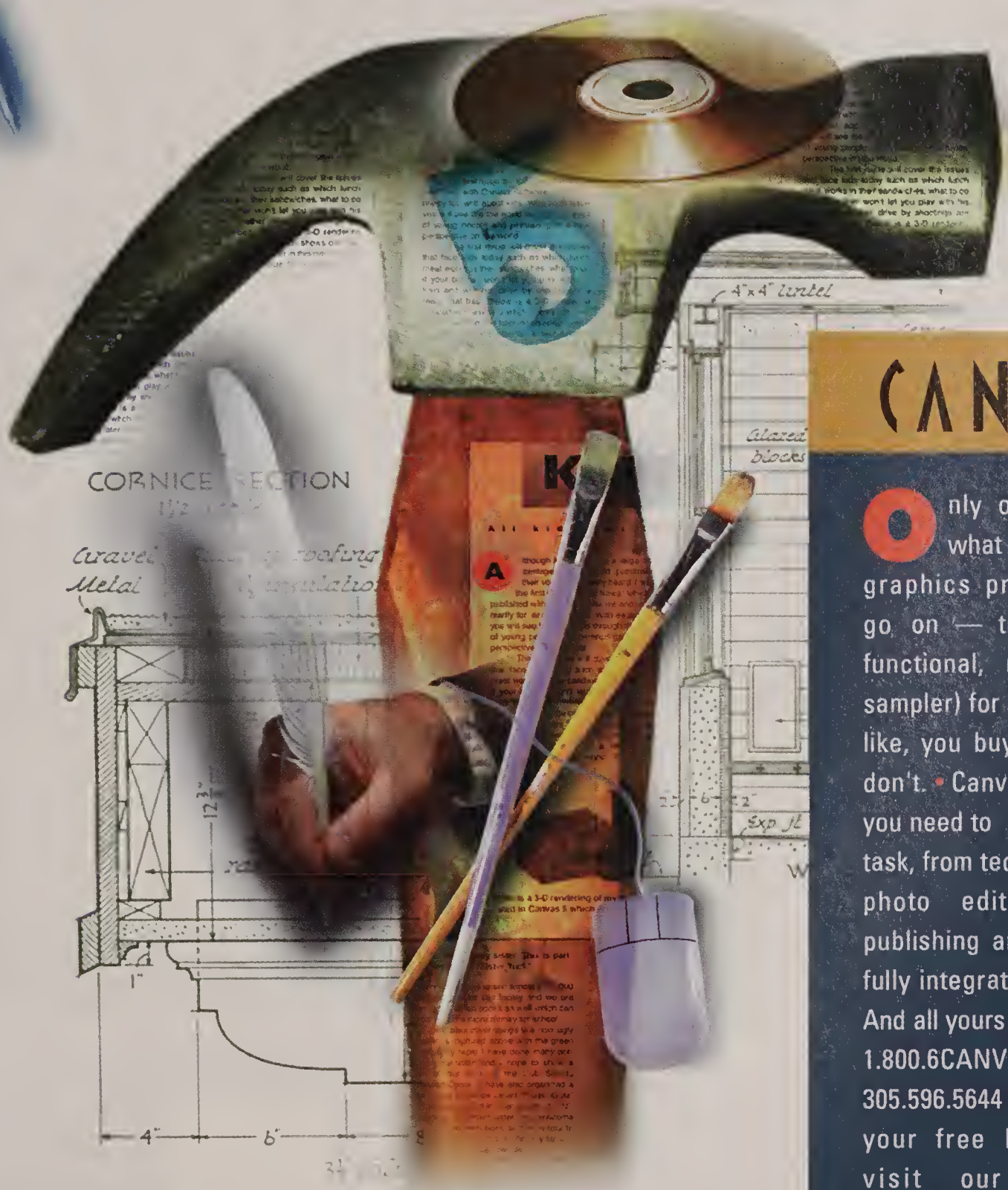

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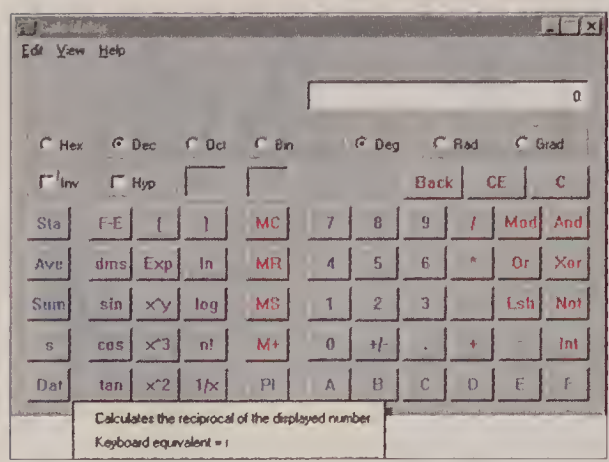


FIGURE 4: TO SEE WHAT A BUTTON DOES, right-click it and choose What's This?

Calculator window and choose *What's This?* A pop-up window appears with a brief description of the key's functions, the keyboard shortcut, and in some cases a few useful tips (see **FIGURE 4**).

This handy reference is available to you in either standard or scientific view.

WINDOWS START-UP: THE CHOICE IS YOURS

IF YOU SPEND most of your computing time in Windows, chances are you've added **win** to the last line of your autoexec.bat file. But what if you need to troubleshoot your config.sys and autoexec.bat files or perform other operations in DOS alone, without Windows running? In that situation, nobody wants to wait for Windows to load, only to have to exit it. So what can you do? Perhaps the easiest solution is to use DOS's Choice command.

If you use DOS 5 or later, add the Choice command to autoexec.bat: First type **edit c:\autoexec.bat** at the DOS prompt. Then delete the Win command if it's already there, and type the following lines at the end of the file, adding a space at the end of the first line:

```
choice /t:y,10 Run Windows now
if errorlevel 2 goto end
win:
end
```

Save the file. DOS will prompt 'Run Windows now [Y/N]?' The default is 'Y', so Windows will run if no key is pressed in 10 seconds. Change the number '10' (up to **99**) to lengthen the wait time, or change 'y' to **n** if you want the DOS prompt as the default.

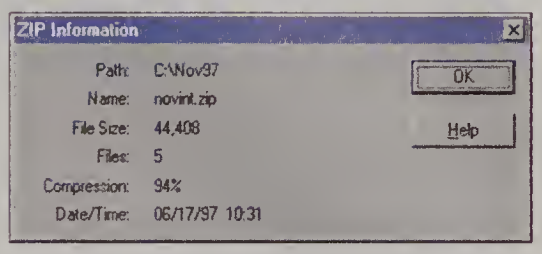
Now when you start your PC, you'll be prompted whether or not to run Windows.

Find links to Web sites mentioned in this article at www.pcworld.com/hereshow. Windows Tips *welcomes questions and pays $50 for printed items. Contributing Editor Scott Dunn is a principal author of* The PC Bible, 2nd Edition *(Peachpit Press, 1995, 800/283-9444). See page 14 for contact information.* ■

Six Tips for Working Efficiently With WinZip

YOU PROBABLY already know about WinZip, Nico Mak's indispensable utility for compressing and decompressing .zip files. (It's available for $29 from www.winzip.com.) Here are six tips that can make WinZip even more useful.

1. Get info. Do you sometimes get lost going through all those .zip files you downloaded from the Web? Get instant information about

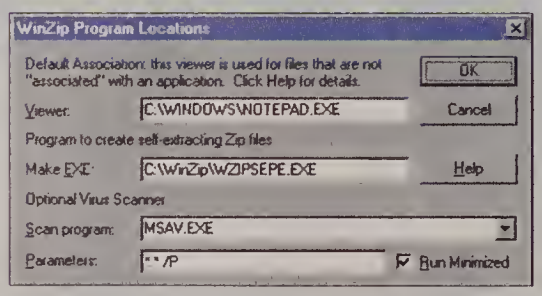


the currently open file in WinZip by clicking the status bar at the bottom of the window.

2. Sort it out. You can sort the files in WinZip's main window by any attribute. Just click any column heading—*Name, Date, Time, Size,* and so on.

3. Don't unzip and rezip—just update. If you've just zipped up that report to send to the home office but suddenly remember a minor change you need to make, don't bother unzipping the file (or changing the original) and then manually updating the zipped file after you've made changes. Instead, treat WinZip as if it were Windows Explorer: Just double-click the .zip file to open it in WinZip. Then double-click the file in the WinZip window. Make your corrections, then save and exit your application. When you exit this application, WinZip asks whether you want to update the .zip file. Click *Yes,* and it's all taken care of. (Note: This updates only the copy in the .zip file, not the original file.)

4. Inoculate files before you extract them. You can have WinZip run your virus scanner on archived files before you extract them, saving you from potential trouble. Choose *Options•Program Locations* and specify your virus software's executable file in the 'Scan program' box, or choose yours from a dozen

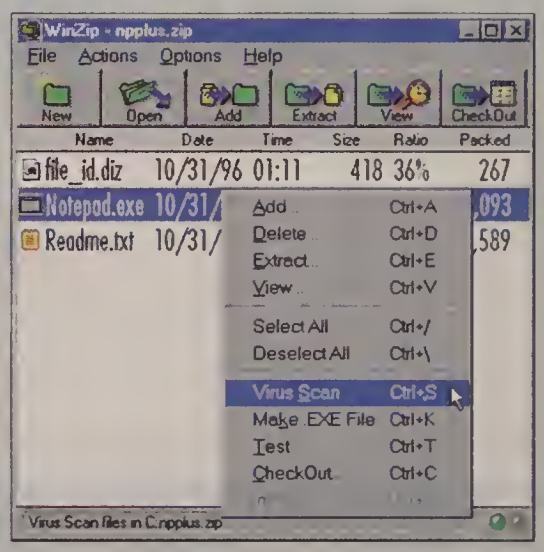


popular virus scanners in the drop-down list. Type in any needed command-line switches in the Parameters box (not necessary if you chose a scanner from the list), then click *OK.*

To check for viruses, open an archive file in WinZip, select one or more files, choose *Actions,* and select *Virus Scan.*

5. Check out files to create a temporary directory. Don't waste time creating a temporary directory for testing the contents of a .zip file and then manually deleting it all later. WinZip does it for you with the CheckOut feature. Just click the *CheckOut* button or choose *Actions•CheckOut.* WinZip extracts the files to a temporary directory, scans them for viruses, and creates an icon group in the Start menu (Windows 95) or in Program Manager (Windows 3.*x*). When you go to perform another operation in WinZip, or just exit it, you're asked whether to delete all the temporary files and icons it just made.

6. Click it right. You don't have to use Windows 95 to get some of WinZip's right-mouse-button features: In any version of the utility, right-click in the WinZip window to get the Actions menu at your mouse pointer.



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‡Price per composite score. Lower number indicates greater price value. For more in-depth information, refer to www.specbench.org/gpc/opc/opc.cdrs summary.html.

Dell's expertise in industry-standard technology gives the Dell WorkStation 400 a price performance edge over selected models from significant competitors. This chart reflects a 3D-graphics-oriented benchmark modeling an environment similar to mechanical CAD.

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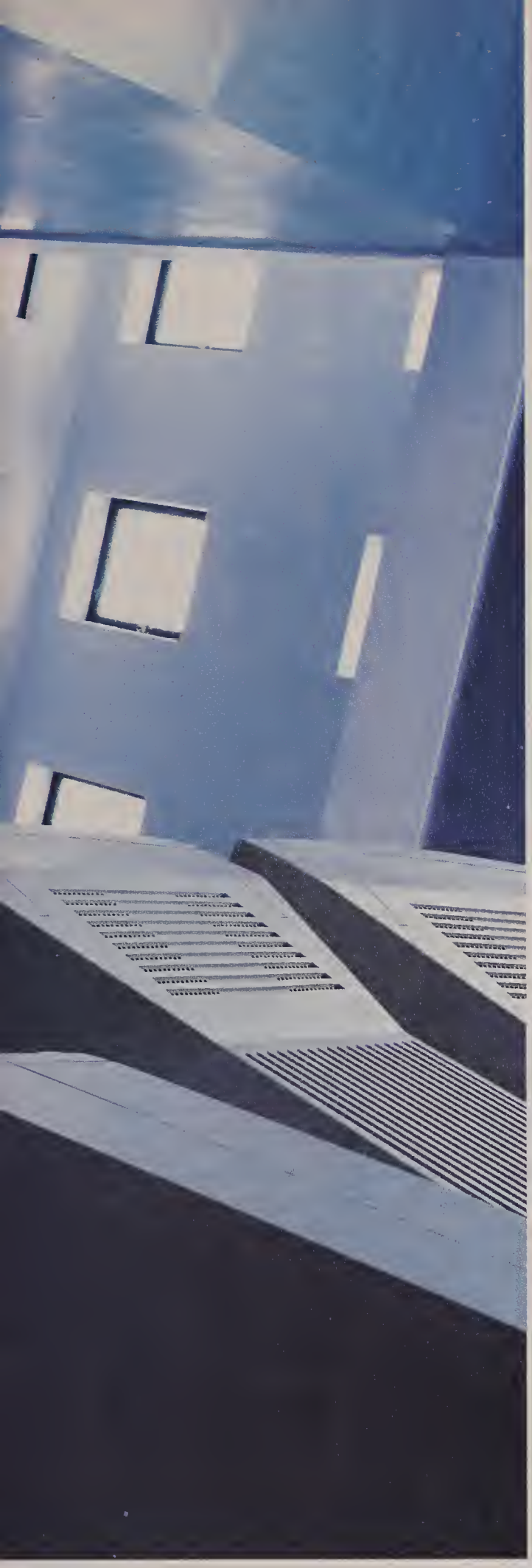

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Rid Excel Worksheets of Outdated Links

WHENEVER I OPEN a particular Excel workbook, I get a message asking if I want to update the links. I've examined every formula in the workbook and am certain it contains no links to any other file. How can I convince Excel of this?

Tim Buehler, Missoula, Montana

I'VE NEVER KNOWN Excel to be wrong about identifying links, so there's an excellent chance your workbook *does* contain one or more links—but they are probably not formula links. These steps will identify and remove any links in a workbook.

1. Select *Edit•Links*. In many cases, this command may not be available. If it *is* available, the Links dialog box will tell you the name of the source file for the link.
2. Click the *Change Source* button and change the link to the active file.
3. Select *Insert•Name•Define*. Scroll down the list in the Define Name dialog box and examine the 'Refers to' box (see **FIGURE 1**). Delete names that refer to another workbook or that contain an erroneous reference (such as #REF!).
4. If you have a chart in your workbook, click on each data series in the chart and examine the SERIES formula in the formula bar (see **FIGURE 2**). If the formula refers to another workbook, you've identified the link. To eliminate it, move the chart's data into the current workbook and re-create your chart.
5. If your workbook contains any custom dialog boxes, select each object in each dialog box and examine the formula bar. If any object contains a reference to another workbook, edit or delete that reference.
6. Save your workbook. When you reopen it, Excel won't ask you to update links.

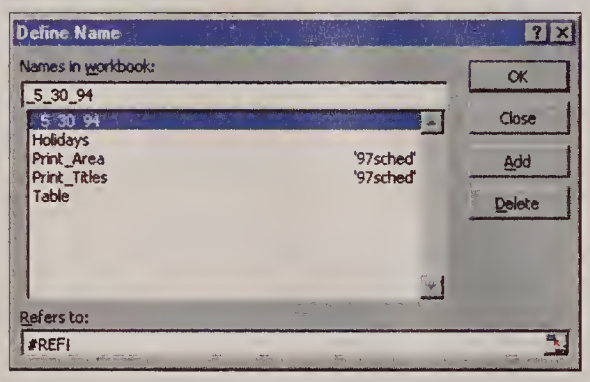

FIGURE 1: CHECK THE NAMES in your workbook for outdated links to other files.

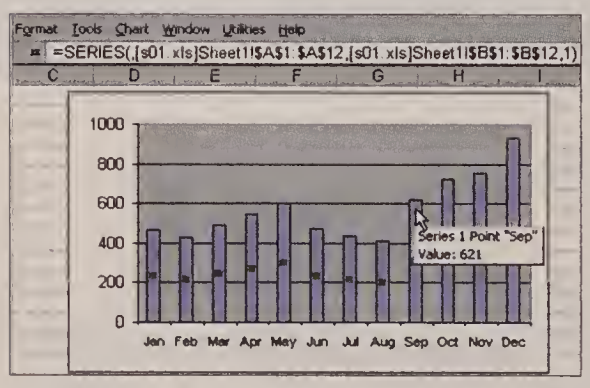

FIGURE 2: CHARTS CAN ALSO harbor obsolete links. Check each data series.

MOVING A SHEET IN 1-2-3 97

I USE 1-2-3 97. Am I crazy, or is there no way to move a sheet to a different position within a file?

Tina Guarlski, Birmingham, Alabama

I CAN'T JUDGE your sanity, but you've uncovered a serious defect in 1-2-3 97. Incredibly, the program has no way to change the order of worksheets in a file. Instead, you must do the following:

1. Select *Create•Sheet* to insert a new worksheet at the desired position.
2. Activate the worksheet you want to move by clicking its sheet tab.
3. Select the entire worksheet by clicking its sheet letter, which is in the upper left corner of the worksheet where the row numbers and column letters intersect.
4. Choose *Edit•Cut*.
5. Activate the empty sheet that you inserted in step 1, and select cell A1.
6. Choose *Edit•Paste*.
7. Delete the old copy of the worksheet.

Before using this technique, be aware of its limitations. First, row heights and column widths won't get copied. And if your sheet has charts, don't bother with this method: The charts get copied along with the cell contents, but the charts will continue to refer to the *original* sheet. Finally, any formulas referring to other sheets won't be copied correctly unless they contain absolute sheet references.

The bottom line? Use this procedure with caution. We can only hope Lotus will correct the problem in a 1-2-3 update.

INSERTING SPECIAL CHARACTERS

WHAT IF YOUR spreadsheet needs to display characters that don't appear on the keyboard, such as a copyright symbol or a foreign character like ñ?

One solution that works for all Windows spreadsheets is to use Windows' Character Map program. Highlight the character you want from the Character Map (see **FIGURE 3**), then copy and paste it into any application.

You can also type the symbol directly from the keyboard; the bottom right corner of Character Map shows you the keystrokes. To insert the copyright symbol, say, hold down the **<Alt>** key and type the digits **0 1 6 9** on the numeric keypad.

If you use Excel, you can employ its AutoCorrect feature to automatically replace an alphanumeric sequence with a special character or symbol. For example, when you type **(c)**, the sequence is replaced with ©. AutoCorrect has a few common symbols built in, but you can use the *Tools•AutoCorrect* command to add more. As with Windows' Character Map tool, you'll need to know the four-digit <Alt> sequence for each character.

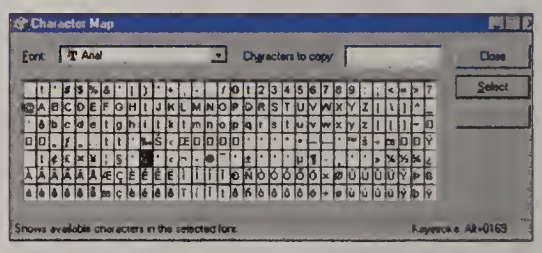

FIGURE 3: INSERT SPECIAL SYMBOLS by copying them from Windows' Character Map.

Spreadsheets welcomes your questions and tips and pays $50 for published items. Contributing Editor John Walkenbach is the author of many books on spreadsheets and maintains The Spreadsheet Page (www.j-walk.com/ss/). See page 14 for contact information. ■

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Wrap Text Around Graphic Images in Word 97

WORD 97 INTRODUCED a new way to wrap text around a graphic image, allowing the text to follow the contours of the image rather than just the box enclosing an imported graphic. Here, and in **STEP BY STEP**, is how to make this work for you.

1. Select *Insert•Picture* to import a picture into your document. Then size and position it as you would with any image.
2. Click the *Text Wrapping* icon on the Picture toolbar.
3. Select *Edit Wrap Points* from the resulting pop-up menu.
4. If your image is a .wmf file, Word contours the text wrapping points around the image automatically. Otherwise, you'll need to do this manually: Click the crosshair pointer anywhere on the red dotted outline around the graphic and drag the outline to a new position. Repeat this as often as you need to, until the dotted red outline closely follows the contours of the image.
5. Once you've established all the contours, just click outside the image to resume editing and formatting text. Word will automatically wrap existing or new text around the contours you've set up, overwriting the graphic's background.

REPEAT A SEARCH IN WORD

IF YOU'VE USED the Edit•Find command in any version of Word to locate a text string in a document, and then closed the Find and Replace dialog box, you can use a keyboard shortcut to find the next occurrence of the same text without reopening the dialog box. Just press **<Shift>-<F4>**. This works even after you've closed the document, letting you conduct the same search instantly in another document.

CREATING OVERLINES IN WORD 97

I AM USING Word 97 to write an instruction book on formal logic. For this book, I need to create a line over text to indicate certain logical functions. It's easy enough to underline words, but I can't find any way to put a line above them. Can you help?

Kenneth Howard Fleischer, Los Angeles

OVERLINING IS NOT available in Word. That's unfortunate, since logicians and mineralogists, along with a few others, need to be able to do this. However, Word's Drawing toolbar contains all the tools you'll need to do this manually, since you can draw directly on the screen. But to make your overlining look good, you'll have to use a few tricks. Before you begin, make sure your document is otherwise complete and ready for printing. An overline does not automatically move when you add or delete text.

Here's a way that you can approach this difficult job:

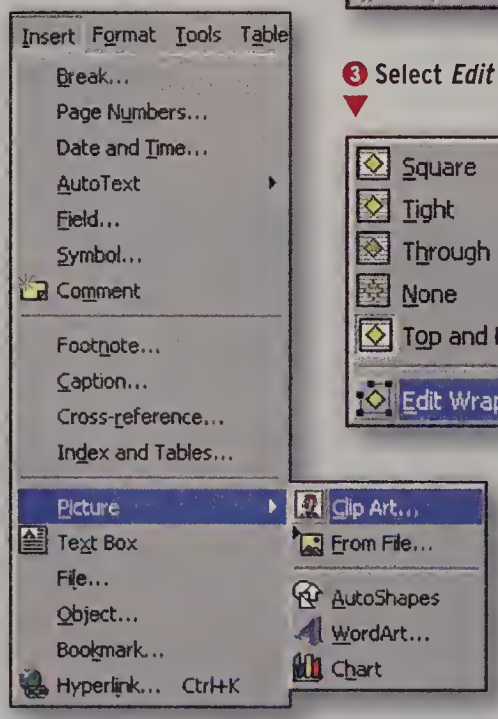
1. Click *Zoom* on the main toolbar and select 200% to get an enlarged view of your document.
2. If the Drawing toolbar isn't displayed, right-click the main toolbar and select *Drawing* from the pop-up menu.
3. Click *Draw* on the Drawing toolbar, then select *Grid* from the pop-up menu. In the Snap to Grid dialog box, select *Snap to grid* to unmark the check box, then click *OK*. This lets you draw lines to a specific length, rather than to the fixed invisible grid locations on the page.
4. Locate the first block of text you want to overline, then click and drag to select just the text, not the spaces surrounding it. This highlighted block will help you position your line.
5. Click the *Line* icon on the Drawing toolbar, then **<Shift>**-click and drag with ▶

STEP BY STEP

Make Your Word 97 Text Flow Around the Contours of an Image

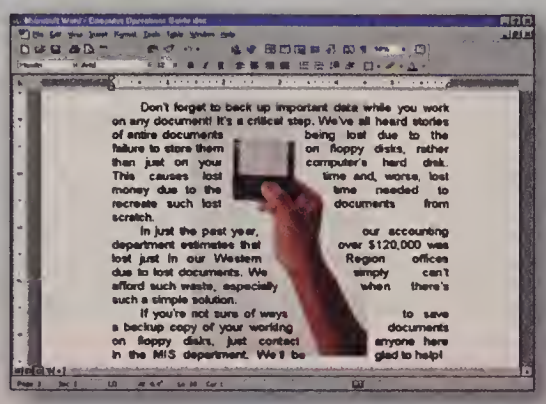
❶ Select an image, then place it and size it as you would any image.

❷ Click the *Text Wrapping* icon on the Picture toolbar.

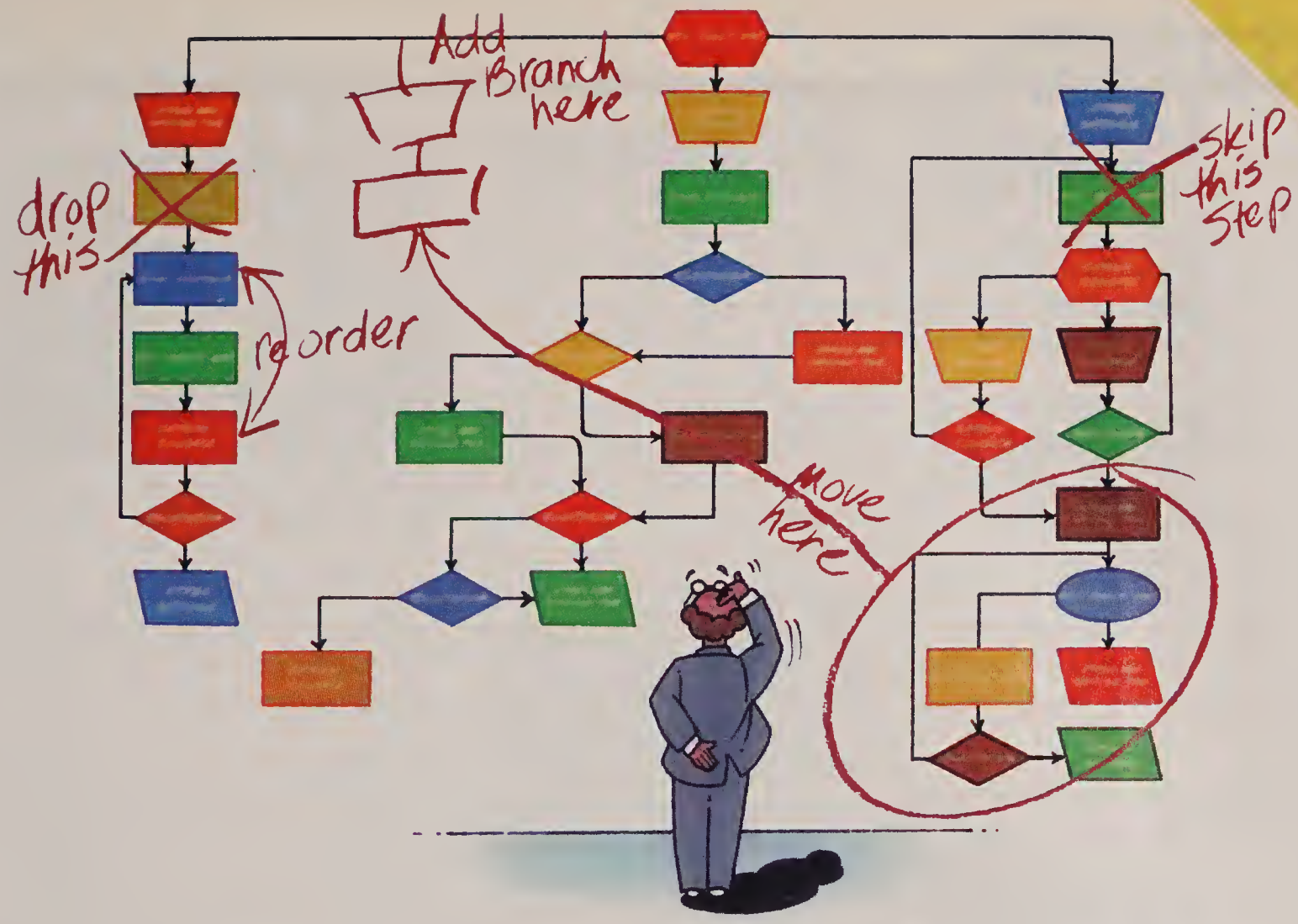


❸ Select *Edit Wrap Points* from the icon's pop-up menu. ▼

◀ ❹ Drag the red dotted outline so that it follows the image contours closely.



❺ When you click outside the image, Word ▶ will automatically wrap existing or new text around the image.



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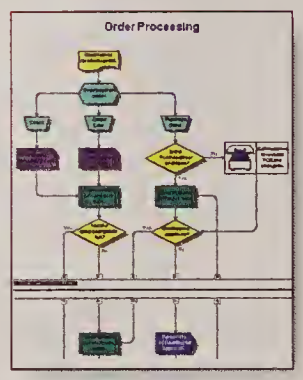

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the crosshair pointer to draw a horizontal line along the top of the highlighted box. Combining the <Shift> key with the mouse forces the line to be drawn horizontally, even if your hand wanders. Release the mouse button when the line is the length you want.

6. Click the *Line Style* icon on the Drawing toolbar and choose a line width to suit your needs.

7. Repeat steps 4 and 5 for each overline.

While this may seem tedious, you'll find that it goes quite quickly once you've drawn a few lines. If you must edit the text after drawing lines, you can move the line back over the text by simply clicking on it and dragging.

CUSTOMIZE TOOLBAR ICONS IN WORDPERFECT

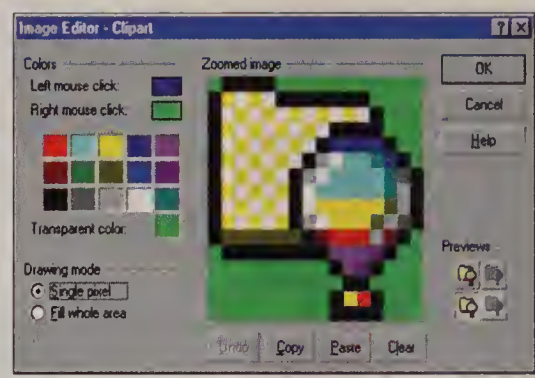
CHARLES SNYDER OF Bethany, Oklahoma, suggested this tip for customizing the toolbar icons in WordPerfect versions 6.1 through 8.0. While most of the default icons are just fine, you may want to alter their colors, or completely change an icon to something that's more meaningful to you. Here's how to make your WordPerfect toolbar icons look just the way you want them to:

1. Right-click anywhere on the toolbar, then select *Edit* from the pop-up menu.

2. In the Property Bar Editor, find the icon that you want to edit, right-click it, and select *Customize* from the resulting pop-up menu. You may have to drag the dialog box out of the way if you're working at 640 by 480 resolution.

3. In the Customize Button dialog box, click *Edit* in the Image frame.

4. The Image Editor dialog box will appear next (see the figure at right). You can alter the icon's colors or redraw the icon pixel by pixel if you wish. The Zoomed image will show you the changes you made to the smaller icon.



ANY WORDPERFECT TOOLBAR ICON can be easily customized.

5. When you have finished with your icon, just click *OK* in each of the open dialog boxes to return to WordPerfect and make your changes permanent.

Word Processing *welcomes your questions and tips and pays $50 for published items. Contributing Editor George Campbell contributed to* The PC Bible *(Peachpit Press, 1995, 800/283-9444). See page 14 for contact information.* ■

Select Text Quickly in Word, WordPerfect, and Word Pro

Clicking and dragging the mouse pointer isn't the only—or the fastest—way to select text. In fact, once you learn a few simple tricks, you may never have to click and drag again. Check the table below for better ways to select text in Word, WordPerfect, and Word Pro.

TO SELECT...	IN WORD	IN WORDPERFECT	IN WORD PRO
a word	Double-click the word.	Double-click the word.	Double-click the word.
multiple words, word by word	Double-click and hold on the first word, then drag.	Double-click and hold on the first word, then drag.	Double-click and hold on the first word, then drag.
a line	Click in the margin to the left of the line.	Click at the beginning of the line, then drag down one line.	Click at the beginning of the line, then drag down one line.
a sentence	<Ctrl>-click anywhere in the sentence.	Double-click anywhere in the sentence, or click in the margin to the left of the line.	<Ctrl>-click anywhere in the sentence.
multiple sentences, sentence by sentence	<Ctrl>-click in the first sentence, then drag.	Double-click in the first sentence, then drag across or downward.	<Ctrl>-click in the first sentence, then drag across or downward.
a paragraph	Double-click in the margin to the left of the paragraph.	Triple-click in the paragraph, or double-click in the margin to the left of the paragraph.	<Ctrl>-double-click anywhere in the paragraph.
multiple paragraphs, paragraph by paragraph	Double-click in the margin to the left of the first paragraph, then drag downward.	Double-click in the margin to the left of the first paragraph, then drag downward.	<Ctrl>-double-click in the first paragraph, then drag downward.
an entire document or division	Triple-click in the left margin.	Right-click in the left margin, then choose *Select All* in the pop-up menu.	Right-click anywhere in the text, then choose *Select•Entire Document (or Division).*
any amount of text	Click at the beginning of the selection, then <Shift>-click at the end. Scroll if needed to view the end of the selection.	Click at the beginning of the selection, then <Shift>-click at the end. Scroll if needed to view the end of the selection.	Click at the beginning of the selection, then <Shift>-click at the end. Scroll if needed to view the end of the selection.
a rectangular block of text, irrespective of sentences or paragraphs	<Alt>-click and drag over the desired area, continuing to hold down <Alt>.	Click at the upper left corner of the desired rectangle, then drag to the lower right corner. Ignore the highlighting. Select *Edit•Select•Rectangle.*	Not possible.

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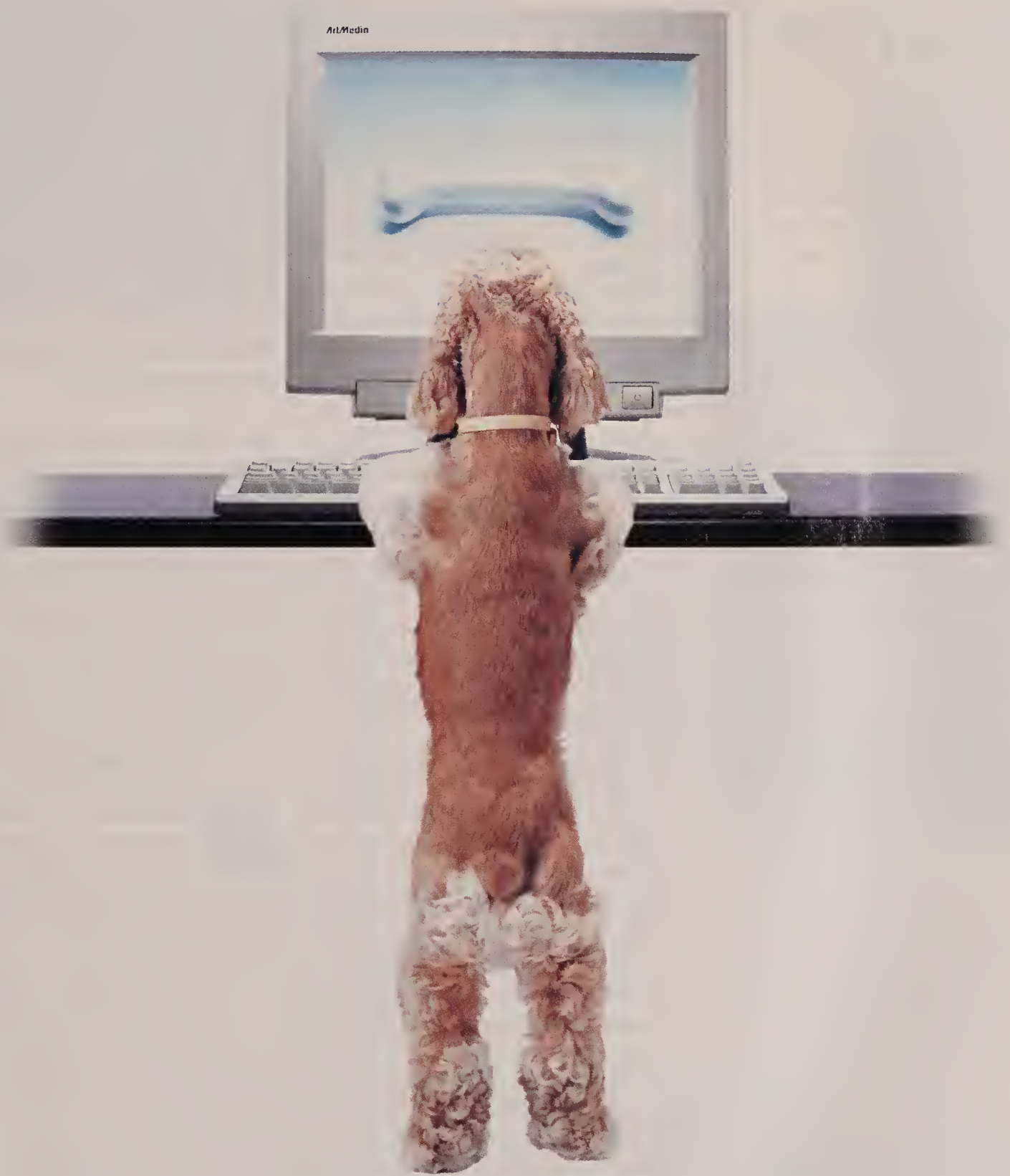

THE EDITORS AT BYTE MAGAZINE HAVE SOMETHING TO BARK ABOUT. BYTE JUST VOTED ARTMEDIA'S 17" MONITOR THE BEST 17" MONITOR. MAYBE IT WAS OUR ADVANCED TRINITRON TECHNOLOGY, THE FLATTER SCREEN OR THE SUPER-FINE PITCH. OUR MONITORS OFFER SHARPER RESOLUTION, BETTER FOCUS,

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Is it a browser or an operating system? ◆ Don't assume 800 numbers are free

Wipe Out All Web Tracks

CONSIDERING HOW eager Web surfers are to hide all traces of their URL visits, you'd think Netscape and Microsoft would include privacy features in their browsers. It wouldn't be hard to make Navigator or Explorer automatically erase cache directories, bookmarks, and history and temporary files and even clean out URLs from Windows 95's Registry after a user logs off the Internet. But neither browser does.

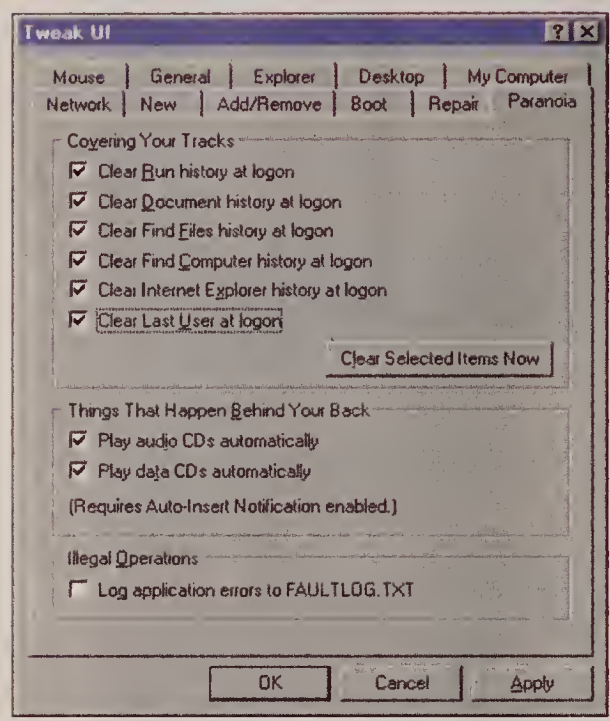


FIGURE 1: TWEAK UI CLEARS URLs from IE's history file, but not from the Windows Registry.

Both browsers do have features that will erase bookmarks and history files globally, and Navigator even lets you erase the disk cache where it stores graphics from the Net, but it makes you pick through labyrinths of menus. Neither browser is equipped to clean up these things automatically after a Web surfing session. And neither offers an easy way to block cookies.

David T. Hartl of Traverse City, Michigan, thought he'd found a solution in Tweak UI, a Microsoft PowerToy (available at www.microsoft.com). He checked all the boxes on the Paranoia page, but it still didn't delete all information pertaining to URLs he'd visited.

Enabling the Paranoia options (**FIGURE 1**) will clear Internet Explorer's history file, but it won't erase URLs from the Registry. Nor will it exterminate cache directories and temporary files. Also, you need to shut down Windows and restart or reboot for the purge to take effect.

James Hoffer of St. Joseph, Michigan, devised a more complete solution: a batch file that deletes all history and temporary files, the cache directory, and cookies. **FIGURE 2** shows sample batch files for both Netscape Navigator and Internet Explorer.

If you're running Windows 95, you can launch your batch file by clicking on a desktop Shortcut after you close your browser. To create the Shortcut, find the batch file in Windows Explorer, right-click and drag it to the desktop, then select *Create Shortcut Here* from the resulting pop-up menu. If, after running one of the batch files, you get any 'Access Denied' messages, restart Windows 95 and run the batch file again.

Maybe the best and easiest strategy is to get a copy of NSClean Privacy Software from Kevin McAleavey (www.wizvax.net/kevinmca; 888/282-5887). It deletes your Navigator bookmarks, history file, and cache directory and refuses cookies (see **FIGURE 3**). IEClean, also from McAleavey, works similarly for Internet Explorer. Each program costs $30 for the Windows 3.*x* version, $40 for the Windows 95 version.

For more on keeping your Web browsing private, see *Internet Tips*, April 1997.

For Netscape Navigator

```
echo y>c:\windows\tempor~1\y.txt
del c:\progra~1\netscape\naviga~1\cache\*.* <c:\windows\tempor~1\y.txt
del c:\progra~1\netscape\naviga~1\cookies.txt
del c:\progra~1\netscape\naviga~1\netscape.hst
del c:\windows\cookies\*.* <c:\windows\tempor~1\y.txt
del c:\windows\history\*.* <c:\windows\tempor~1\y.txt
del c:\windows\tempor~1\*.* <c:\windows\tempor~1\y.txt
```

For Internet Explorer

```
echo y>c:\windows\tempor~1\y.txt
del c:\windows\cookies\*.* <c:\windows\tempor~1\y.txt
del c:\windows\history\*.* <c:\windows\tempor~1\y.txt
del c:\windows\tempor~1\*.* <c:\windows\tempor~1\y.txt
```

FIGURE 2: DELETE ALL TRACES OF YOUR WEB WHEREABOUTS with one of these simple batch files for Navigator and Explorer.

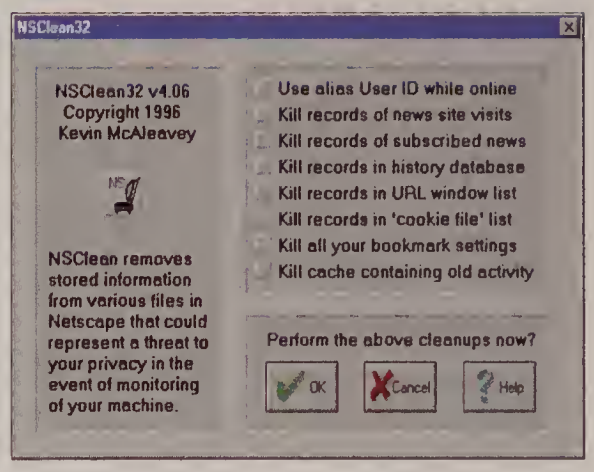
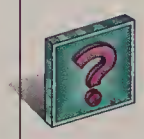


FIGURE 3: NSCLEAN AUTOMATICALLY ERASES all evidence of Web visits.

WHY IS MICROSOFT GIVING EXPLORER AWAY?



MICROSOFT HAS SPENT millions developing, promoting, and distributing Internet Explorer, yet it continues to give the program away. We all know there's no such thing as a free lunch. What does Microsoft have up its sleeve?

Matthew Brenengen, St. Paul

YOU'RE RIGHT, Matthew, it is intriguing that Microsoft devotes more effort to developing and promoting its free browser than it does to advancing any of its other desktop applications, like Excel. Why? Probably because Microsoft is worried that someday soon, Web browsers like Netscape's could dethrone Windows, particularly on office PCs.

Browsers are capable of running applets such as spreadsheets, database programs, even word processors, thanks to languages like Java and ▶

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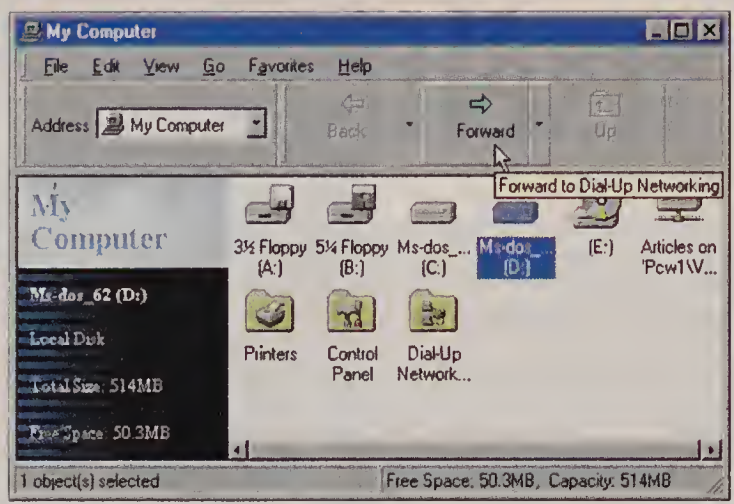


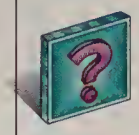
FIGURE 4: WHAT'S WINDOWS, WHAT'S WEB BROWSER? As Microsoft merges its Internet Explorer browser into Windows 95, standard Windows components can take on a Web-like feel. Here's one view of My Computer, on a Windows 95 PC with Internet Explorer 4.0 installed.

programming technologies such as Microsoft's own ActiveX. On an office intranet, a PC can run application software that resides on the network server, downloading documents to the PC via the browser. The only software you need on your desktop PC is a browser. Can you see where this scenario is going? Netscape could turn Navigator into the next PC operating system standard.

If any Web browser is going to supplant Windows, Microsoft wants to make sure that it's a Microsoft browser. To this end, the company has been feverishly assembling the other pieces that will help it rule the corporate intranet—pieces like Microsoft Internet Information Server (a Web server bundled with Windows NT Server) and ActiveX. And Internet Explorer 4.0 will be a key component of Windows 98, making it hard to tell where browser stops and operating system starts (see **FIGURE 4**).

So don't think of Internet Explorer as just another Web browser. It's fast becoming your next operating system.

BEWARE OF 1-800-NOTFREE?



WHEN I SAW an ad for AT&T WorldNet, it sounded like a great deal, and I signed up. I used the 800 number listed in the sign-up material, since the closest local access number was a toll call from my home, and I assumed that the number was free. After using the service for less than a month, I went to the accounting page of the service and discovered that I had a $420.32 bill for calling the 800 number.

I spoke with a supervisor at WorldNet, and he said that AT&T would reduce my bill by 50 percent. However, I received a bill for the full amount. I paid it because I didn't want to destroy my credit rating, but I mailed a letter of complaint with my payment. I eventually received a rebate for about $130. That's hardly 50 percent. Can you help?

John C. Tranfaglia
Woburn, Massachusetts

WORLDNET spokesperson Rick Sacks clarified that AT&T had given Tranfaglia a rebate of 50 percent of the 800-num- ▶

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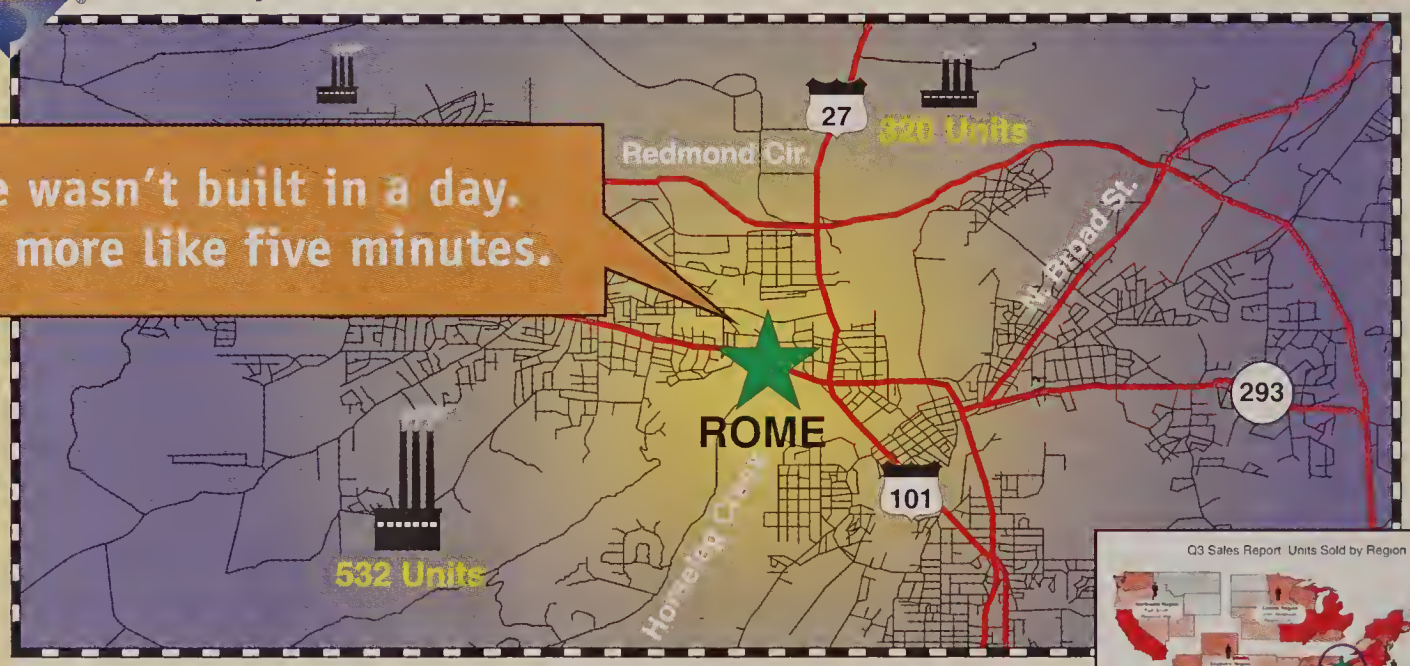

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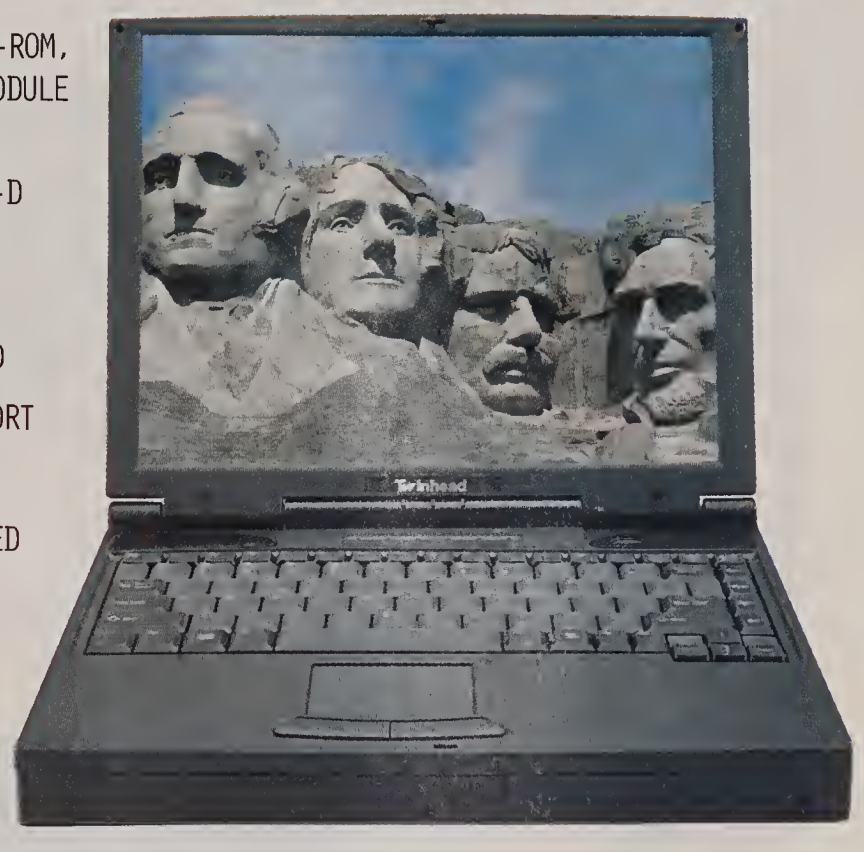

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Circle 240 on reader service card

ber portion of his bill. "He was dealt with fairly," says Sacks. "He was informed at sign-up when he went through the registration screens that there was an extra charge for 800 number access. He was offered a rebate that was more generous than we normally give."

Tranfaglia says he didn't realize there was an extra fee for 800 number access—he did not see the note about the charge on the screen. He has since filed complaints with the Massachusetts attorney general and the Better Business Bureau. He has also canceled his AT&T long-distance service, his AT&T credit card, and his WorldNet account.

America Online and CompuServe also charge for their 800 access numbers—an extra $6 an hour. But they make no secret of it. When you enter an 800 number into an AOL setup screen, a pop-up message tells you you've typed in a toll number. The service also shows the extra surcharge whenever it lists an 800 access number.

Theresa Owens, CompuServe public relations coordinator, says that new customers rarely assume 800 numbers are free. Charges are noted wherever those numbers are listed on the service, and CompuServe's software will not automatically set up for 800 number access.

When a new customer does mistakenly assume an 800 number is free, both AOL and CompuServe are sometimes forgiving, but it depends on the situation. "We really provide refunds on a case-by-case basis," says Tricia Primrose, America Online spokesperson. "We don't have a standard procedure," says CompuServe's Owens. "We'll work with the customer."

But if you've been calling the 800 number for six months, good luck.

Find more tips at www.pcworld.com/hereshow. Internet Tips *pays $50 for printed items. Contributing Editor Judy Heim is the author of* The Needlecrafter's Computer Companion *(No Starch Press, 1995, 800/420-7240).* *See page 14 for contact information.* ■

Start Your FTP Program From Internet Explorer

I'M ANNOYED THAT Internet Explorer offers no built-in FTP file upload feature like Navigator's. But I've discovered that I can assign a Links button in Explorer to launch my own FTP software.

Here's how. Select *View•Options* from the Explorer menu and click the *Navigation* tab. Click the *Page* drop-down box and select one of the Quick Link settings. Type a name in the Name box, and in the Address box type the location of the software.

If you're using Internet Explorer 3.2, it will ask if you want to download or open the program. Select *Open*. You'll receive a message that the program does not have a special signature. Click *Yes* to open the program.

In Internet Explorer, click *Links* in the top right corner of the screen in order to display the Links buttons.

Michael Edmonson, Internet

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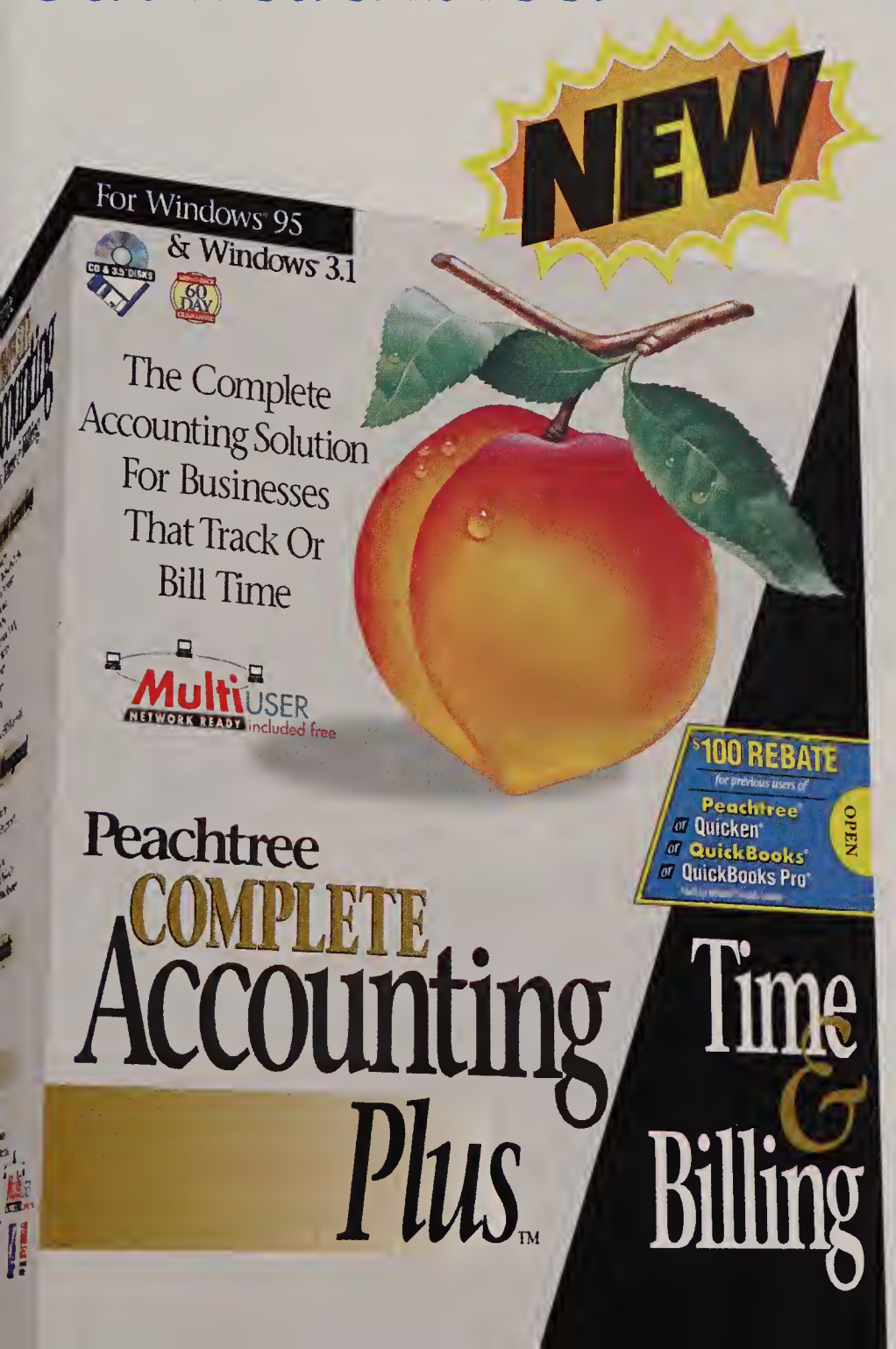

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Get answers to tricky hardware questions ◆ Bypass Scandisk on start-up

You Can Look It Up

SO YOU'VE FINALLY got that second hard drive with its desperately needed gigabytes of space. Now you just need to read the installation instructions in that well-written, clearly illustrated manual that came with your computer. Right?

Unfortunately, finding answers to hardware questions is rarely easy. With the abysmal quality of vendor-supplied documentation—or sometimes the complete lack of any manuals—you'll have to search elsewhere for hardware answers.

OFF THE SHELF

THE RIGHT REFERENCE book is probably the fastest way to find information. A book can't match the Internet for depth and breadth of information, but books are usually far more efficient and should always be your first source.

A quick glance at the computer section of any large bookstore can be intimidating, though. There's not only a huge selection of titles, but each one of them can set you back $40 or more.

When browsing titles, first check the table of contents for topics you're interested in; books with lots of subsections tend to be more useful. Next, look at the index—it's your most valuable tool for finding information quickly and is a great indicator of the book's level of detail. Then skim a few sections to get a sense of the book's accuracy, ease of use, and depth.

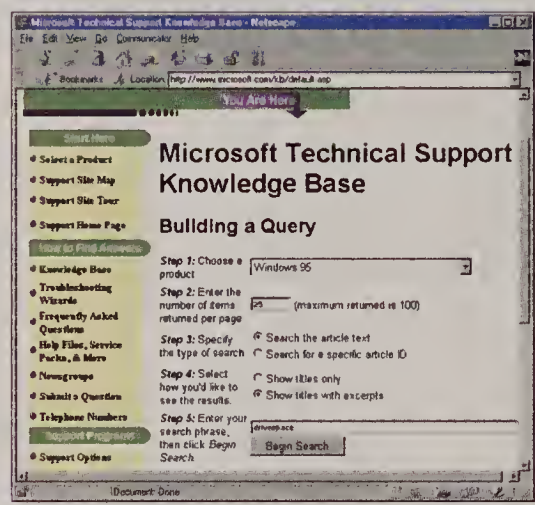

FIGURE 1: MICROSOFT'S Knowledge Base site provides troubleshooting tips.

Look carefully at how up-to-date the information is. Most hardware books—including one of our recommendations (see "A Few of Our All-Time Favorite Reference Books")—were written before Windows 95 appeared. And while a book may boast a "covers Windows 95" banner, many titles just added Win 95 information as an afterthought. A good test is to look up "FAT32" in the index. This hard drive support feature is included only with the latest versions of Windows 95.

FIND WISDOM ON THE WEB

EVERYTHING YOU NEED to know is on the Internet—somewhere. But finding it isn't easy. And when you do find something useful, you can't be sure it's correct.

For credible information, start with your vendor's Web site. Internet-based tech support has improved dramatically over the last year, and many vendors offer searchable knowledge bases that list all kinds of bugs, how-to's, and technical information. (And yes, they're too cheap to print these details in their manuals.)

If that doesn't work or there's no vendor Web site, try Microsoft's Technical Support Knowledge Base at www.microsoft.com/kb/default.asp (see **FIGURE 1**). Since many hardware issues are closely tied to interactions with Windows, this is an excellent place to look for info on bugs ▶

A Few of Our All-Time Favorite Reference Books

HARDWARE

◆ *The Complete PC Upgrade and Maintenance Guide* by Mark Minasi ($54.99, Sybex, 1996, 800/227-2346) is a great source for the motivated beginner or intermediate user who wants to know more about PC subsystems and making repairs and upgrades. Look for the updated eighth edition.

◆ *Troubleshooting Your PC* by Jim Aspinwall and Mike Todd ($34.95, MIS Press, 1996, 800/288-2131) lists symptoms and causes of common hardware problems, as well as solutions. It also has basic explanations of hardware systems, cabling diagrams, and a list of DOS error messages. The third edition is weak on Windows 95.

◆ *Upgrading and Repairing PCs* by Scott Mueller ($65, Que, 1996, 800/428-5331) is well suited to the experienced PC enthusiast looking for deeper background or upgrade tips.

◆ *The Winn L. Rosch Hardware Bible* by Winn Rosch ($65, SAMS, 1997, 800/428-5331) is an excellent reference for anyone wishing to learn the nuts and bolts of PC technology. The latest version—the Premiere Edition—is up-to-date and comprehensive and comes with a CD-ROM.

WINDOWS 95

◆ *The Mother of All Windows 95 Books* by Woody Leonard and Barry Simon ($39.95, Addison-Wesley, 1996, 800/822-6339) provides humorous and sometimes unorthodox tidbits about Windows 95. You'll find lots of attitude, good explanations, and multiple non-Microsoft perspectives.

◆ *Microsoft Windows 95 Resource Kit* ($49.95, Microsoft Press, 1995, 800/677-7377) is the official party line on Windows 95. Much of the book is available for free on your Windows 95 CD-ROM in the Admin/Reskit/Helpfile folder.

PRINTERS

◆ *Laser Printer Secrets* by Steven Burrows ($19.95, BlackLightning Publishing, 1996, 800/252-2599) covers the whole subject. The online version is at www.dungeon.com/~poota/lpbook/00-toc.html.

◆ *The Underground Guide to Laser Printers* by the editors of *Flash* magazine ($12, Peachpit Press, 1993, 800/283-9444) is a collection of articles from *Flash* about maintaining and getting the most out of your laser printer.

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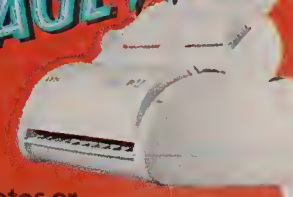

24-bit color sheetfed scanner. Captures photos or documents in seconds. Quick and easy parallel port connection, small, lightweight, and portable. Includes image editing, OCR and document management software. Only $159 (suggested street price)!

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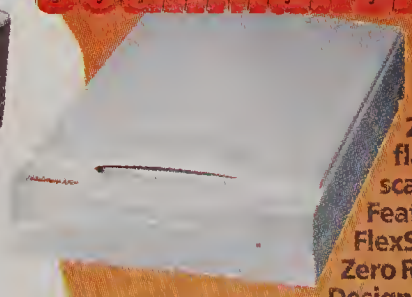

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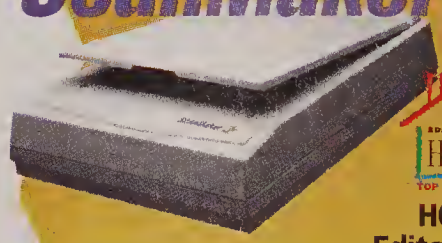
MICROTEK ScanMaker E3



1996 EDITORS' CHOICE HOMEPC TOP 100 HARDWARE

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Prices mentioned are United States suggested street prices. Bundled software on CD-ROM / retail packaging depicted is not available with these products. 50-page Automatic Document Feeder and Transparent Media Adapter options available (sold separately). All products mentioned are trademarks or registered trademarks of their respective holders. Caere Corporation (1-800-535-7226). Prices, specifications and software bundles are subject to change without notice. E6FM697

So why is this OK when it's e-mail?

If the Post Office treated your mail like garbage, you'd be outraged. So why put up with it from your e-mail program? Now there's a way to make sure you're never ever left staring at garbage text instead of an e-mail attachment. It's a hot new clean up program called **e-ttachment Opener™**. From DataViz, the file compatibility specialists.

This nifty utility solves all your problems receiving and reading e-mail file attachments. **e-ttachment Opener** will find the file within the garbage text and turn it back into exactly what you were supposed to receive. Whether that file was sent to you in BinHex, uuEncode or MIME formats. **e-ttachment Opener** also lets you view and print virtually any graphics, word processing, spreadsheet or database file. Even without the application that created it. Or extract almost any compressed file created in Zip, Gzip, z or tar.

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Usenet Hardware Newsgroups
alt.comp.hardware.pc-homebuilt
alt.comp.periphs [1]
alt.sys.pc-clone [1]
comp.periphs.printers
comp.sys.ibm.pc.hardware [1]
comp.sys.ibm.pc.soundcard [1]

[1] Denotes multiple groups.

FIGURE 2: NEWSGROUPS offer grassroots discussions of tricky hardware issues.

and incompatibilities. Also check out PC World Online (www.pcworld.com) for hardware and upgrade information.

Here are a few sites we recommend:

• Everything You Ever Wanted to Know About Modems (www.rosenet.net/~costmo/) features a handy list of technical and personal notes organized by vendor. There's also a nice primer on 56-kbps modems, links to vendors, and FAQs (lists of frequently asked questions).

• The CD Information Center (www.cd-info.com) has lots of practical and industry information and links about CD-ROM, CD-Recordable, and DVD.

• The Driver Zone (www.driverzone.com) is a quick way to find and download a device driver. Links to all the major hardware vendors will take you straight to the driver-download page.

• The Free On-line Dictionary of Computing (wfn-shop.princeton.edu/cgi-bin/foldoc) gives excellent explanations of computer technologies, from the latest types of memory to CPU architectures.

• Penguin's Printer Page (www.primenet.com/~penguink/printers.html) has lots of printer-related information and links.

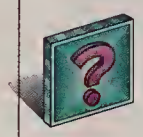
• System Optimization (www.sysopt.com) offers information on all kinds of hardware topics including motherboards, processors, BIOS, and memory, with links to much more.

ASK AROUND

OTHER EXCELLENT sources of information are vendor-supported newsgroups where you can post questions for other users and company specialists. Modeled after Usenet newsgroups, these areas can usually be accessed through company Web sites, and they can be extremely valuable for solving obscure problems.

Don't forget Usenet newsgroups themselves. Most active groups have a FAQ that's easy to find. See **FIGURE 2** for a list of useful hardware-related Usenet groups.

TURN OFF SCANDISK



IF WINDOWS IS NOT shut down properly, Scandisk automatically runs the next time my computer is started. A message pops up saying that Windows was not properly shut down and that there might be an error on the hard drive. Is there any way to avoid running Scandisk every time I forget to properly shut down the computer? And am I risking hard disk errors?

Bob Moore, Portland, Oregon

SCANDISK IS automatically launched by systems that run the OSR2 version of ▶

Boot-up options	Insert this line into msdos.sys	Explanation
Run Scandisk (OSR2 only)		Sets Scandisk run options on boot-up after improper shutdown.
Never	Autoscan=0	
After prompt	Autoscan=1	
Without prompt	Autoscan=2	
Show Windows 95 logo screen		Logo=0 also fixes some incompatibilities with memory managers.
Show screen	Logo=1	
Don't show screen	Logo=0	
Boot from DOS 6.*x* or earlier		Boots from an old version of DOS that's on the hard disk. Pressing <F4> on boot-up starts the same option.
Windows 95	BootMulti=0	
Old DOS version	BootMulti=1	

FIGURE 3: CHANGE WINDOWS 95 BOOT-UP options by editing the msdos.sys file.

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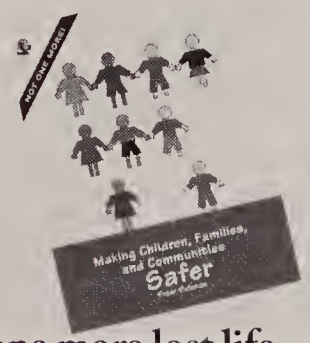

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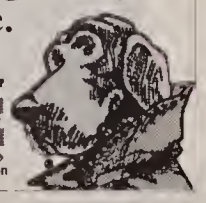

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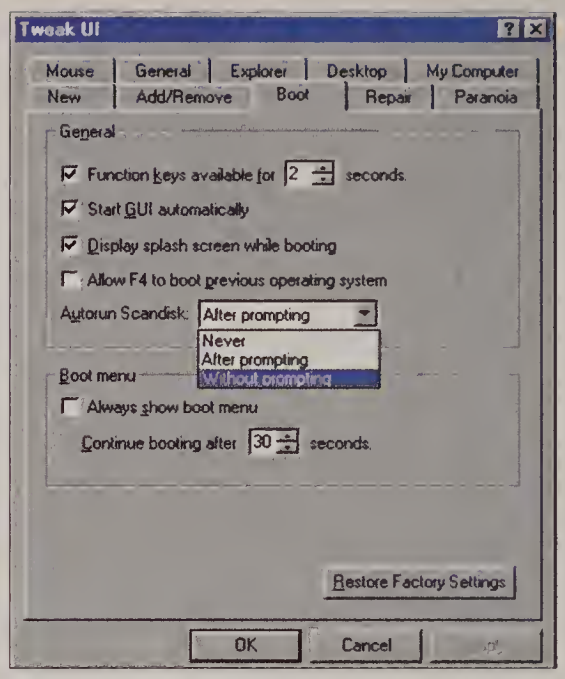

FIGURE 4: THE FREE Tweak UI utility shuts off automatic Scandisk operations.

Windows 95—the standard operating system on most PCs purchased in the last year—if the system was previously turned off before Windows 95's Shut Down process had finished properly.

Scandisk looks for stranded fragments of lost files. Windows 95 is constantly moving files between the hard disk and memory, even when applications are idle. If power is suddenly shut off while a file is being written to disk, that file may get corrupted, and Windows 95's bookkeeping system may lose track of which hard disk sectors belong to that file. So an improper shutdown can mean permanently losing a file or hard disk space.

My advice is to always use Shut Down and avoid these problems altogether. But if you *really* don't want Scandisk to run, here's the fix. Using a text editor, open up the hidden text file msdos.sys located in your root directory and add the line **Autoscan=0** under the [Options] section. You can also set other boot options in msdos.sys (see **FIGURE 3** on page 383). Or change Autoscan and a few other boot options with the Tweak UI applet (**FIGURE 4**), which you can download from PC World Online (www.pcworld.com/files).

online Hardware Tips *welcomes questions and tips and pays $50 for published items. Kirk Steers is a* PC World *contributing editor. See page 14 for contact information.* ■

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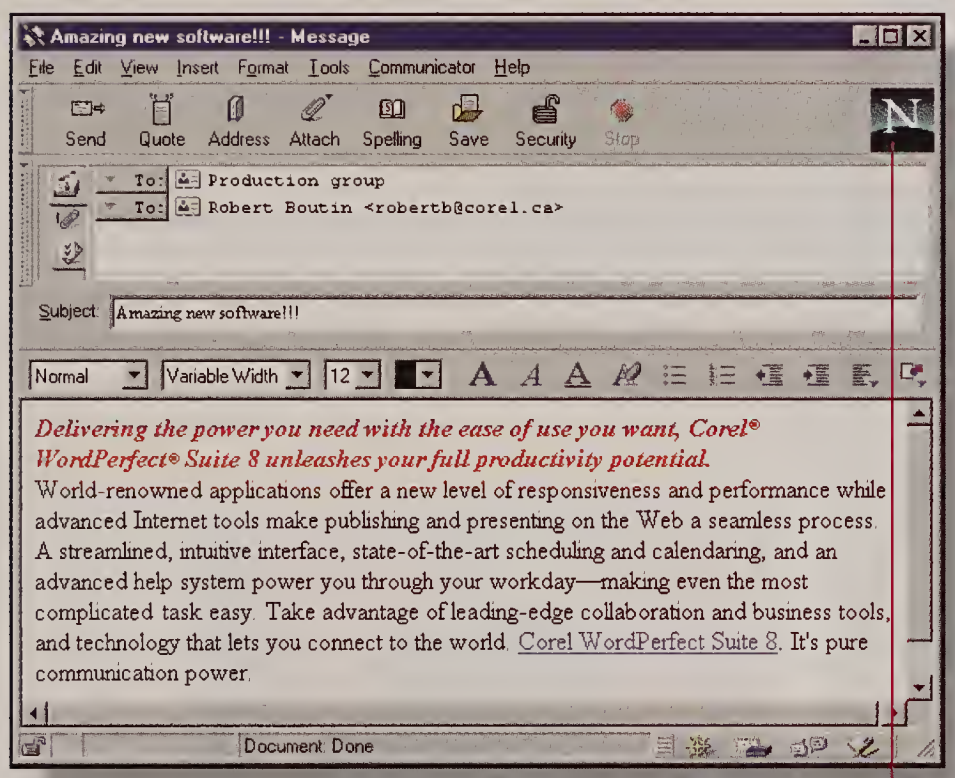

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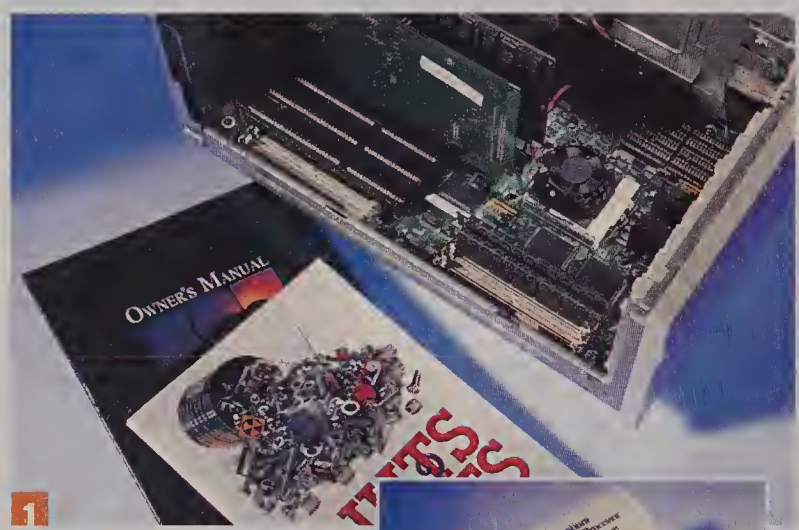
Installing a Faster Processor

UNLESS YOU'VE BEEN hiding in a cave, you've witnessed an avalanche of news coverage and ads about the newest and hottest CPUs. Chip makers with powerful new processors—Intel's Pentium II and Pentium MMX, Advanced Micro Devices' K6, and Cyrix's 6x86MX—all want your business. And CPU upgrades are particularly tempting if your PC is a 486 or an older Pentium model (see the article "Can't-Miss Upgrades" in this issue).

With upgrade kits costing about $100 to $120, almost any 486 machine can be upgraded with a Pentium-class chip from AMD or Cyrix running at either 100 or 133 MHz, depending on which processor you have now. Companies offering such kits include Evergreen (www.evertech.com), Kingston (www.kingston.com), and Trinity Works (www.trinityworks.com).

If your PC is equipped with a 60-, 75-, 90-, or 100-MHz Pentium, there are plenty of upgrade possibilities from these same companies, or from Intel (www.intel.com), which offers upgrades to a Pentium MMX chip. You can upgrade to speeds ranging from 120 to 166 MHz, depending on your current processor. Prices start at about $200 for a Trinity Works kit for upgrading a Pentium-60 to 120 MHz, or a P-75 to 133 MHz. For about $260, Evergreen has a kit to upgrade a Pentium-60 or P-75 CPU to a Cyrix



1

Buy the right upgrade. Find out what CPU you now have—check your manual, try your system setup utility, or run a diagnostic program such as Helix's Nuts & Bolts (www.helixsoftware.com). As a last resort, open the PC's case and look at the CPU; it's usually 1.5 to 2 inches square and covered by a fan or heat sink.

Look for things like plug-in cards near your CPU that might obstruct the upgraded CPU and its fan or heat sink. Next, check with your local dealer or one of the mail-order companies that sell upgrade kits to find a CPU upgrade that matches your computer. Be careful, though, especially if you have a 486 PC: The CPU sockets in 486s come in a confusing mix of shapes and sizes, and sometimes there is just no upgrade that fits.

2

Back up your hard drive. Chances are minuscule that a bad or wrong CPU could damage your data. But standard procedure for this or any other major hardware upgrade is to first do a full backup of your hard disk.

Remove the old CPU. Turn off your PC, unplug it, and remove the cover. Make sure that you're grounded.

Find the CPU. In most cases, it should be out in the open and relatively easy to reach.

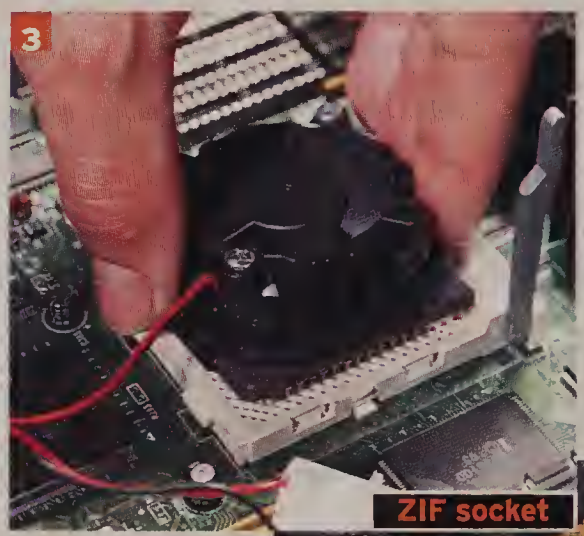
If you must remove add-in cards or unplug cables to gain access, note how everything's hooked up and be sure to label connectors with masking tape.

If your CPU has a fan attached, disconnect the power cable that goes to the fan. (Most CPU upgrades either come with their own fans or have huge heat sinks so they don't require fans.)

Before you remove the CPU, find the edge that has a small diagonal cutout indicating pin 1 and remember its location on the socket—that will be very important when you install the new processor.

Modern motherboards usually include Zero Insertion Force (ZIF) sockets. This simplifies life—you just pull a lever to release the CPU and then lift it out.

But with some older CPUs—especially 486s—you may need to use a special tool included with the upgrade kit to carefully pry out the chip.



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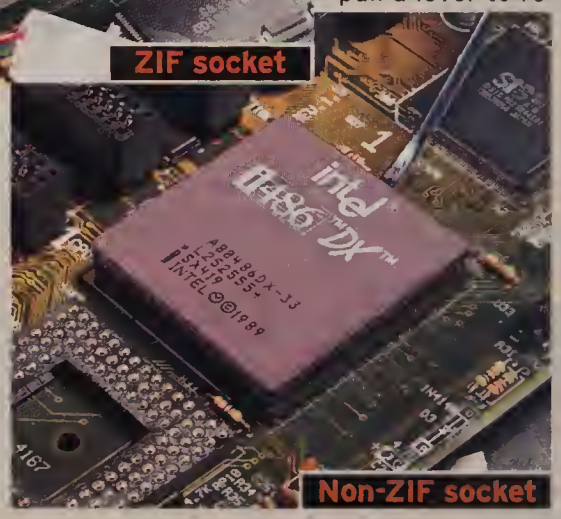

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6x86-PR166+. You can spend $219 for Intel's MMX OverDrive kit to upgrade a Pentium-75 to 125 MHz, or a Pentium-90 to 150 MHz. For a similar price, you can buy an Intel MMX OverDrive that upgrades a Pentium-100 to 166 MHz.

If your PC has a 120- or 133-MHz Pentium, you can probably just remove the current CPU, change a few jumpers, and drop in a standard Pentium-166 or P-200 for about $225 or $300 respectively. Newer motherboards can also handle costlier MMX chips. Check your PC's or motherboard's manual, or call your system dealer or manufacturer to find out whether your motherboard can handle a direct CPU upgrade.

What about the Pentium II? Because of its unique design, this processor requires a specially designed motherboard and isn't an upgrade option.

But don't expect that doubling the CPU speed will double your system's performance. Figure on an average performance increase of about 25 percent, although your mileage may vary. And think carefully about the cost of a Pentium upgrade. A full motherboard-and-CPU upgrade (see *Upgrade Guide,* July) offers a greater performance boost for not much more money than a processor upgrade: About $300 to $350 buys a motherboard and a Pentium-166 chip; add another $100 or so for a Pentium-200.

Also note that some PCs can't be upgraded because they have a proprietary motherboard, a nonstandard BIOS, or a CPU that's soldered permanently to the motherboard. Some upgrade boxes list the PCs the kit won't work with, and some kits come with a floppy disk that tests whether your system can be upgraded. Save your upgrade kit's packing material and receipt—you might have to return it.

Once you've found a suitable CPU upgrade, installing it is generally not difficult but does require time and patience. Here's how to do it.

Stan Miastkowski is a PC World *contributing editor.* ■

Install the new CPU. Ground yourself and then remove the upgrade chip from its protective packaging. Carefully insert it into your PC's processor socket.

Make absolutely sure that the CPU's pin 1 (the edge with the diagonal cutout) is aligned with pin 1 of the socket, which is often marked (see inset on far right). If you insert the CPU incorrectly, you could destroy it when you turn on your PC.

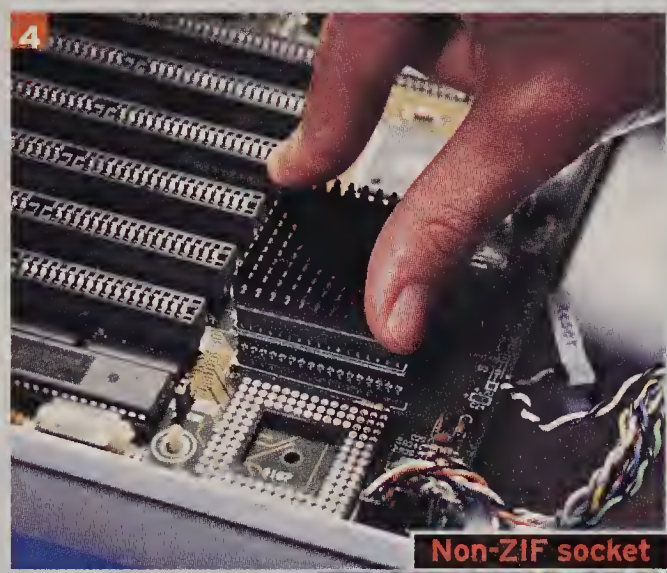
If your motherboard includes a ZIF socket, hold down the new processor firmly with your thumb and push down the lever to lock in the chip.

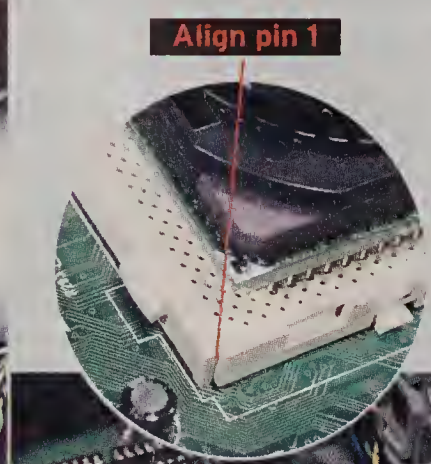
If your motherboard has a non-ZIF socket, however, just press the CPU in firmly and carefully.

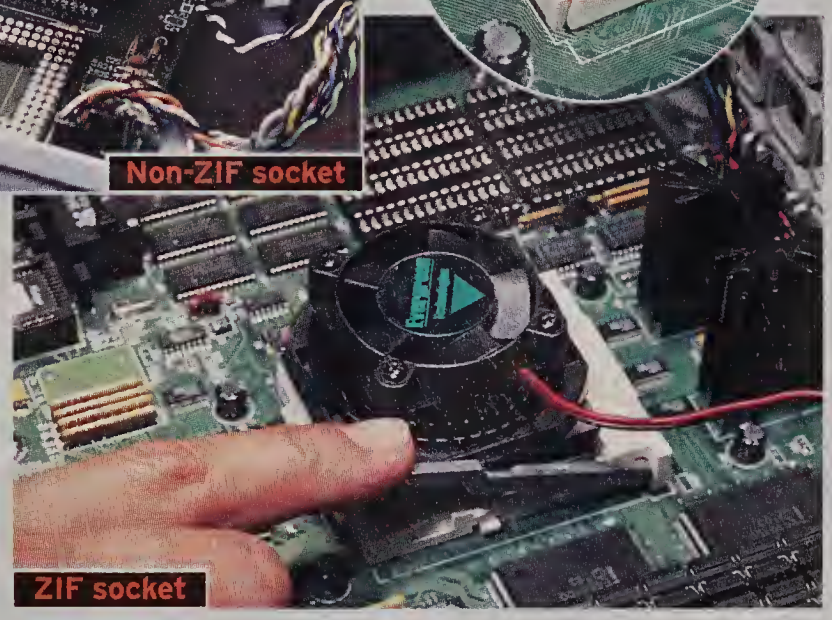
Now plug in your PC and turn it on. Normally, the system should start up and run as usual.

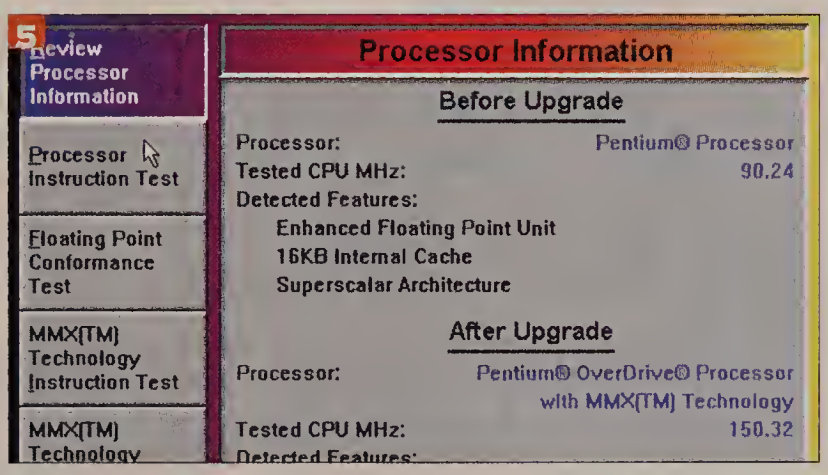
If your PC seems dead, turn the power off immediately and double-check that you've installed the chip correctly.

If the PC still doesn't start, you have either a bad CPU or the wrong type for your machine. Call the upgrade kit vendor's technical support line to get assistance.









Install the upgrade's CPU utilities and check the new chip. Most upgrade kits come with utilities to test the new chip and sometimes to maximize its performance. Read your kit's manual carefully for instructions, then run the utilities to see how much speed you've gained. (The utility for Intel's OverDrive upgrade, shown here, includes a typical battery of tests.)

Before you put its cover back on, take your PC through its paces. Test all your applications to make sure they're working correctly.

If your PC locks up while running applications or has other problems, it's time to call the upgrade vendor's tech support line. Difficulties probably indicate that the upgrade is the wrong type for your PC.

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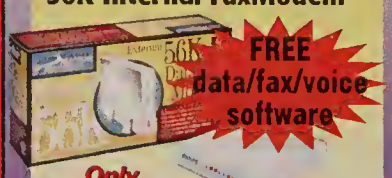

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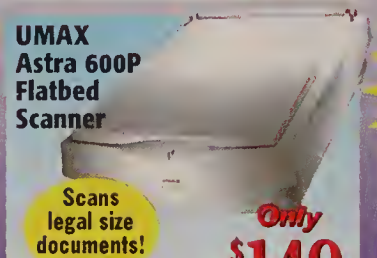

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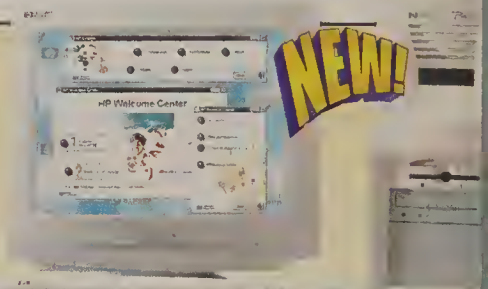

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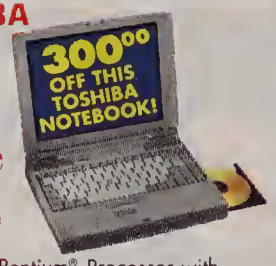

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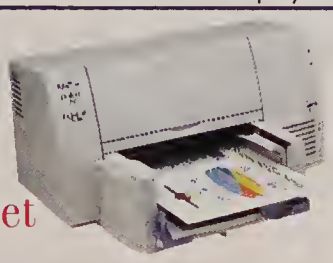

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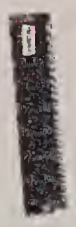

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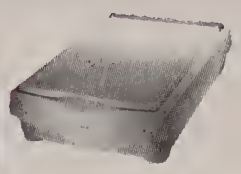

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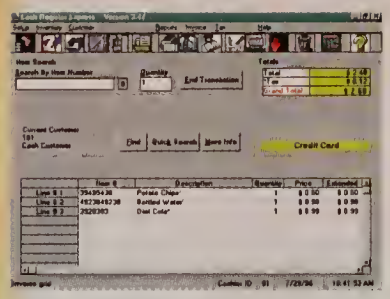

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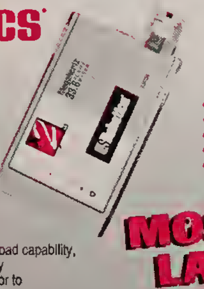

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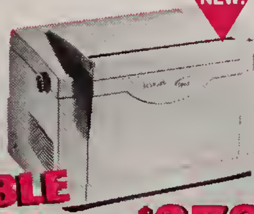

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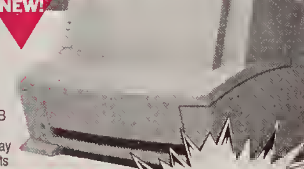

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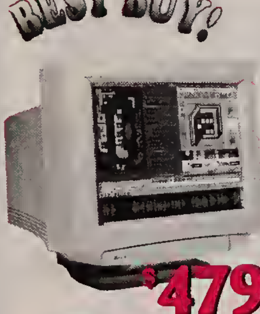

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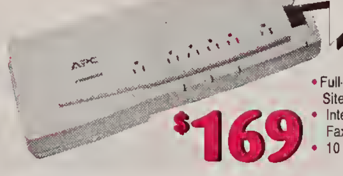

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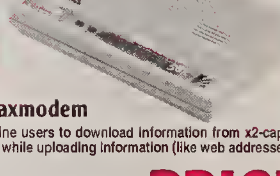

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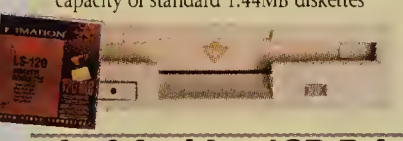

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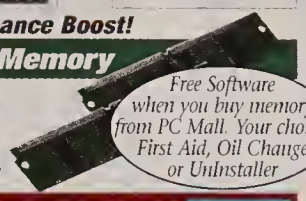

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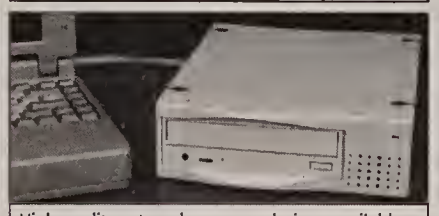
WIDE SCSI	**$129**	**$75**	**$64**

Weather resistant cartridge carrying case $30



High quality external storage solutions available in parallel or PCMCIA (type 2) interface.

Hard Drive	Parallel	PCMCIA
2.5GB	$289	$389
3GB	$319	$419
4GB	$369	$469
5GB	$459	$559
CD ROM		
24X	$179	$279

DVD
HITACHI
GD-2000
• Supports CDR, and CDRW media
• IDE interface
• DVD-2 Reader, 150ms
• 20X CD ROM, 90ms

Bare Drive $249
Drive with PCI DVD/MPEG-2 decoder $459

IDE HARD DRIVES

IDE	***RPM***	***Brand***	***Model***	***Price***
1275MB	4500	Seagate	ST31277A	$140
12B1MB	5200	Western Digital	AC11200	$152
1624MB	5200	Western Digital	AC21600	$160
1700MB	4500	Seagate	ST31720A	$153
1750MB	44B0	Maxtor	MB1750A	$173
1750MB	5400	Fujitsu	MPA3017A	$157
2000MB	4500	JTS	JTS2000	$170
2000MB	5200	Western Digital	AC22000	$177
2100MB	44B0	Maxtor	MB2100A	$1B0
2132MB	4500	Seagate	ST32132A	$170
2500MB	**5200**	**Micropolis**	**MC4525A**	**$175**
2557MB	4500	Seagate	ST32531A	$173
2559MB	5200	Western Digital	AC22500	$197
2560MB	5400	Maxtor	MB2560A	$1B0
2620MB	5400	Fujitsu	MPA3026A	$175
3000MB	4500	JTS	JTS3000	$199
3166MB	5200	Western Digital	AC33100	$209
3201MB	44B0	Maxtor	MB3201A	$219
3245MB	4500	Seagate	ST33240A	$195
3500MB	5400	Fujitsu	MPA3035A	$194
4000MB	5200	Western Digital	AC34000	$266
4000MB	**5200**	**Micropolis**	**MC4540A**	**$246**
4320MB	4500	Seagate	ST34340A	$260
4320MB	44B0	Maxtor	M84320A	$262
4320MB	3600	Quantum	BF4335A	$211
4326MB	4500	Seagate	ST34340A	$259
4370MB	5400	Fujitsu	MPA3043A	$256
5000MB	**5200**	**Micropolis**	**MC4550A**	**$309**
5120MB	5400	Maxtor	MB5120A	$337
5250MB	5400	Fujitsu	MPA3052A	$319
6450MB	5400	Seagate	ST36450A	$359
64B0MB	3600	Quantum	BF6510A	$315
7000MB	5200	Maxtor	MB7000A	$431

SCSI HARD DRIVES

Add a DPT 2044UB Ultra SCSI controller $199

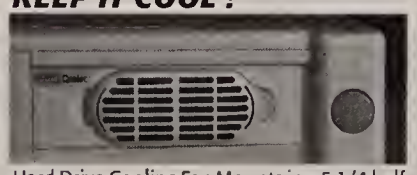
SCSI	***RPM***	***Brand***	***Model***	***Price***
1050MB	5400	Seagate	ST31055N	$242
2150MB	5400	Seagate	ST52160N	$229
2151MB	5400	Quantum	FB32160S	$235
2160MB	7200	Seagate	ST32272N	$425
2275MB	7200	Quantum	VK32275S	$359
322BMB	5400	Quantum	FB33240S	$299
4300MB	5400	Micropolis	MC4743	$335
4310MB	5400	Quantum	FB34320S	$345
4400MB	7200	Fujitsu	M2954S	$559
4550MB	7200	Micropolis	MC4345	$529
4550MB	7200	Micropolis	MC4345AV	$595
4550MB	7200	Seagate	ST34572N	$619
4550MB	7200	Quantum	VK34550S	$565
4550MB	7200	Quantum	XP34550S	$665
4550MB	10,000	Seagate	ST34501N	$715
644BMB	5400	Quantum	FB364B0S	$449
9100MB	**7200**	**Micropolis**	**MC3391**	**$909**
9100MB	7200	Fujitsu	M2949S	$979
9100MB	7200	Quantum	XP39100S	$969
9100MB	7200	Micropolis	MC3391AV	$969
9100MB	7200	Seagate	ST19171N	$9B9
9100MB	10,000	Seagate	ST19101N	$1139
23300MB	5400	Seagate	ST423451N	$1B99

WIDE HARD DRIVES

Add a DPT 2044UWB Ultra Wide SCSI controller for $249

WIDE	***RPM***	***Brand***	***Model***	***Price***
1050MB	5411	Seagate	ST31055W	$329
2160MB	7200	Seagate	ST32272W	$459
2275MB	7200	Quantum	VK32275W	$359
4300MB	**5400**	**Micropolis**	**MC4743W**	**$355**
4400MB	7200	Fujitsu	M2954W	$569
4550MB	7200	Micropolis	MC4345W	$555
4550MB	7200	Micropolis	MC4345WAV	$619
4550M8	7200	Seagate	ST34572W	$659
4550M8	7200	Quantum	VK34550W	$565
4550MB	7200	Quantum	XP34550W	$669
4550MB	10,000	Seagate	ST34501W	$759
9091MB	**5400**	**Micropolis**	**MC3391W**	**$929**
9091MB	5400	Micropolis	MC3391WAV	$990
9100MB	7200	Fujitsu	M2949W	$1019
9100MB	7200	Quantum	XP39100W	$969
9100MB	7200	Seagate	ST19171W	$1029
9100MB	10,000	Seagate	ST19101W	$1179
23300M8	5400	Seagate	ST423451W	$1949

KEEP IT COOL !



Hard Drive Cooling Fan Mounts in a 5 1/4 half height drive bay. Compatible with any 3 1/2" hard drive. Features twin cooling fans and a washable air filter. A must for 7200 and 10,000 RPM drives. (CHDFAN) $30

CD ROM DRIVES

IDE CD ROM

Speed	8rand	Model	ms	Int
12X	CyberDrive	CY8ER12X	150	$69
16X	Mitsumi	CRMCFX16X	120	$92
16X	NEC	CDR1600	100	$89
20X	Lite On	LTN202A	120	$88
24X	Panasonic	CR585	85	$100
24X	Mitsumi	CRMCFX24X	90	$102
24X	Toshiba	XM61028	85	$101

IDE CD CHANGERS

Speed	8rand	Model	# Disks	Int
6X	NEC	CDR4X6	4	$89
8X	NEC	CDR4X8	4	$105
12X	Panasonic	SQTC512N	5	$266

ACCESSORIES
Buy a CD drive & sound card & get a FREE audio cable.
Creative Labs Sound Blaster 16 Value PnP (SBIDE) $69
Creative Labs Sound Blaster AWE64 (SB64AWE) $100
Creative Labs Sound Blaster AWE64 (SB64AWEGOLD) $1B0
Professional speakers with 8ose style swivel speakers and separate subwoofer.
25 Watt (SPEAKERJR) $99 35 Watt (SPEAKERPRO) $129
Universal sound cable(AUDIOMIX) $9
Turn any IDE CD ROM into an external for parallel printer port (PPCASECD) $89
Turn any IDE CD ROM into an external for PCMCIA port (PCMCIACASECD) $189

SCSI CD ROM

Speed	8rand	Model	ms	Int
12X	Toshiba	XM57018	115	$139
12X	Plextor	PX12TS(tray)	105	$209
12X	Plextor	PX12CS(caddy)	105	$259
15X	Toshiba	XM38018	99	$149
16X	NEC	CDR1610	100	$139
20X	Plextor	PX20TS	95	$229

SCSI CD CHANGERS

Speed	8rand	Model	# Disks	
16X	Nakamichi	MJS16	5	$239

SCSI CD TOWERS

			4 Drive	7 Drive
15X	Toshiba	99ms	$879	$1479
16X	NEC	100ms	$879	$1479
20X	Plextor	95ms	$1299	$2249

SCSI CD TOWERS w/ 5 Disc Changers
Nakamichi 16X 150ms $1399 $2399
Ethernet adapter option available. Call.

CD RECORDERS

Sony 2x6
Internal SCSI drive (CDU926S) $309*

Yamaha 4x6
Internal SCSI drive tray load (YCDR400T) $479*
Internal SCSI drive caddy load (YCDR400) $489*

Ricoh 2x6 CD ReWritable
Internal SCSI drive 1MB, tray load (RO6200S) $429*
Internal SCSI drive 2MB, caddy load (RO6201S) $479*

Hewlett Packard SureStor 6020I
SureStor 6020I includes software, and 1 disk
Internal SCSI (C4343CDR) $369
Complete internal kit w/ controller (C4343CDR-1) $409
External for parallel printer port (C4345A) $545

Sony 2x8
Internal IDE (C0U92BS) $349*
Kit w/ 1 disk, and software compatible with Win 95 & Win NT 3.51 & up. Req IDE controller. (CDU92BSKIT) $369

Mitsumi 2x6
IDE Kit includes 3 disks, and software compatible with Win 95 & Win NT 3.51 and up. Requires IDE controller.
Internal (CRMC2600TE) $405
*Drive must be purchased with CDR software or media.

ULTRA IDE HARD DRIVES

FUJITSU					
1750MB	10ms	5400	MP3017U	3	$162
2620MB	10ms	5400	MP3026U	3	$180
3500MB	10ms	5400	MP3035U	3	$202
4370MB	10ms	5400	MP3043U	3	$265
5250M8	10ms	5400	MP3052U	3	$325
QUANTUM					
1614MB	10ms	5400	FB31620A	3	$170
2151MB	10ms	5400	FB32160A	3	$181
3228M8	10ms	5400	FB33240A	3	$212
4310MB	10ms	5400	FB34320A	3	$249
6448MB	10ms	5400	FB36480A	3	$345
MAXTOR					
7000MB	10ms	5200	MB7000D	3	$453
SEAGATE					
2111MB	12ms	4500	ST32122A	3	$177
3227MB	12ms	4500	ST33232A	3	$195
4303M8	12ms	4500	ST34342A	3	$249
WESTERN DIGITAL					
4304MB	11ms	5400	AC34300	3	$290
5160MB	12ms	5400	AC35100	3	$365

Promise PCI Ultra IDE Controller (ULTRA33) with drive ***$50***

We Can: Install any of these drives in external enclosures, and custom configure to your specifications.

TAPE DRIVES

EXABYTE

3.5-7Gig	8mm, 32MB/min, EX8B205XL	$1169
7-14Gig	8mm, 120MB/min, ELIANT820	$1519
7-14Gig	8mm, 60M8/min, EXB8700LT	$679
7-14Gig	8mm, 60MB/min, EX8B700	$919
(EXB8700 includes: 1 tape, 1 cleaning tape, and backup software)		
20-40Gig	8mm, 360MB/min, EXBB900	$3679
70-140Gig	8mm, 60M8/min, EXB10H	$4239

HEWLETT PACKARD

2Gig	DAT, 11MB/min, C1534AI	$579
2-4Gig	DAT-DC, 42MB/min, C1536AI	$609
4-8Gig	DDS-2 DAT, 60MB/min, C1599AI	$799
12-24Gig	DDS-3 DAT, 120MB/min, C1554AI	$1099
72-144GB	DDS-3 DAT, 120MB/min, C564BA	$2649

SEAGATE

2-4Gig	DAT-DC, 66MB/min, STD24000N	$5B9
4Gig	Mini, 29MB/min, TST8000	$339
4-8Gig	DDS-2 DAT, 66MB/min, STD2B000N	$795
12-24Gig	DDS-3 OAT, 132MB/min, STD224000N	$1059

SEAGATE MINI CART
Prices include Dos/Win backup software & 1 tape

800M8	TR1, TST800R $89	Parallel ver	$129
3.2Gig	TR3, TST3200 $179	Parallel ver	$185
4-8Gig	TR4, TST8000 IDE or SCSI		$339

SONY **$20 rebate w/ hard drive purchase**

4-BGig	DDS-2 DAT, 44MB/min, SDT5000AI	$689
4-BGig	DDS-2 DAT, 90MB/min, SDT7000AI	$759
12-24Gig	DOS-3 DAT, 144MB/min, SDT9000AI	$1039
32-64Gig	OOS-2 DAT, 90MB/min, TSL7000X	$2099

QUANTUM

15-30Gig	DLT, 150MB/min, DLT2000XT	$2499
20-40Gig	DLT, 1B0MB/min, DLT4000	$3239
75-150Gig	DLT loader, 150MB/min, DLT2500XT	$4779
100-200Gig	DLT loader, 1B0MB/min, OLT4500	$6219
105-210Gig	DLT loader, 150MB/min, DLT2700XT	$6529
140-280Gig	DLT loader, 180MB/min, DLT4700	$8099

REMOVABLE DRIVES

IOMEGA 100MB ZIP

Internal SCSI for PC (ZIP100I)	$145
Internal IDE for PC (ZIP100A)	$139
External SCSI for PC or Mac (ZIP100)	$145
External for PC parallel port (PPZIP100)	$145
100MB disks (ZIP100C) Qty 2-9/Qty 10+	$1B/$14

IOMEGA 1Gig JAZ

Internal SCSI with 1 disk (JAZI)	$285
External SCSI in our case with 1 disk (JAZEX)	$348
External SCSI in Iomega case with 1 disk (JAZX)	$388
Disks Qty 2-4/5-9/10+ 1Gig	$87/$85/$82

SYQUEST 230MB Flyer

Ext. SCSI (EZ230S)	$190
Ext Parallel(EZ230PP)	$190
Extra Disks Qty 2-4/5-9/10+	$28/$26/$24

SYQUEST 1.5GB SyJet

Int. SCSI (SYJET1.5PCI)	$368
Ext SCSI (SYJET1.5PCX)	$459
Extra Disks Qty 2-4/5-9/10+	$86/$84/$82

OPTICAL DRIVES

FUJITSU Call about 5 Free Disks w/640MB Drives!
230MB •12BMB compatible, 30ms, 3600rpm
Internal IDE w/ 1 free disk (M2541AC) $279
640MB • 230MB r/w & 12BMB read compatible, 2MB buffer
Internal SCSI w/ 1 free disk (M2513A2WC) $419

MAXOPTIX
2.6Gig • (1.3Gig, 650MB r/w compatible) , 1MB buffer
Internal SCSI (TAHITI2.6) $1439

TORAY
650MB • PD drive 650MB rewritable and 4X CD ROM in one.
SCSI Kit w/ controller & 1 disk Int (PWK650) $349

SMART STORAGE SOLUTIONS
4.6Gig •2.6Gig compatible, 19ms,
Internal SCSI & 1 disk (SSS4.6WC) $1179

Optical Disks (LIFETIME WARRANTY) 2-4/5-9/10+

128M8	[TJ128]	$14	$12	$10
230M8	[TJ230]	$15	$13	$11
540M8 3 1/2"	[TJ540]	$28	$26	$22
640M8 3 1/2"	[TJ640]	$30	$28	$26
1.2G8 512K	[TJ1.2]	$33	$31	$29
1.3G8 1024K	[TJ1.3]	$33	$31	$29
2.3G8 512K	[TJ2.3]	$45	$43	$41
2.6GB 1024K	[TJ2.6]	$45	$43	$41

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MEMORY

LIFETIME WARRANTY

SECURITY WILL CALL WINDOW NOW OPEN! NO SURCHARGE FOR MC, VISA AE & DISCOVER

HOT BOX SPECIALS

HP 4, 4P, 5P, 6P, 5MP – 2Meg	14.00
Panasonic Laser 6500 – 2Meg	14.00
HP Deskjet 1200C, LP – 2Meg	14.00
Lexmark Optra – 2Meg	14.00
1 x 9-80	9.00
1 x 9-70	12.00
1 x 3-70	6.00
1 x 9-60	12.00
Compaq Concerto – 8Meg	39.00
TI 5000, 5100, 5200 Base – 8Meg	29.00

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DIMMS (168 pin)

SDRAM – INDUSTRY STANDARD, DELL & GATEWAY

3.3V (2 clock)	8Meg	50.00
3.3V	16Meg	94.00
3.3V	32Meg	179.00
3.3V	64Meg	429.00
3.3V	128Meg	950.00
3.3V	256Meg	1925.00

APPLE

1 x 64	8Meg	50.00
2 x 64	16Meg	89.00
4 x 64	32Meg	169.00
8 x 64	64Meg	312.00
16 x 64	128Meg	975.00

INDUSTRY STANDARD DIMMS

Unbuffered	16Mg	32Mg	64Mg	128Mg	256Mg
3.3V ECC, EDD	119	219	425/499	989	–
3.3V E00	99	175	344	–	–
5.0V E00	99	175	344	1231	–
5.0V FPM	119	219	425/499	989	–
Buffered					
3.3V ECC, E00	119	224	425/499	989	2425
3.3V ECC, FPM	119	224	425/543	1025	2425
5.0V ECC, FPM	119	224	462	999	–

72 PIN SIMMS (FPM, EDO)

	60NS	70NS	80NS
1 x 32 4 mg	22	22	22
2 x 32 8 mg	42	42	42
4 x 32 16 mg	69	69	69
8 x 32 32 mg	139	139	139
16 x 32 64 mg	419	419	419
1 x 32 4 mg EDD	22	22	22
2 x 32 8 mg EDD	42	42	42
4 x 32 16 mg EDD	68	68	68
8 x 32 32 mg EDO	139	139	139
16x32 64 mg EDD	419	419	419
256 x 36	14	–	
512 x 36	19	–	
256 x 32	9	–	
512 x 32	19	–	
1 x 36 4 mg	32	32	32
2 x 36 8 mg	57	57	57
4 x 36 16 mg	79	79	79
8 x 36 32 mg	159	159	159
16 x 36 64 mg	449	449	449

ECC SIMMS

Pentium Pro 72 Pin (Install in pairs) / SIMMS

8Meg	59.00	64Meg	549.00
16Meg	109.00	128Meg	1089.00
32Meg	219.00		

SIMM MODULES

(Add $5.00 for SIPP)	60NS	70NS	80NS
1Meg x 3 (3 chip)	11.00	11.00	11.00
1Meg x 9 (9 chip)	17.00	17.00	17.00
4Meg x 3 (3 chip)	24.00	24.00	24.00
4Meg x 9 (9 chip)	29.00	29.00	29.00
16Meg x 9 (9 chip)	119.00	119.00	119.00

CACHE MEMORY

- 512K (IBM Part # 92G7336) – $59.00 works with PC700, PC750, Aptiva C+ Series
- 256K (160 pin) Pipeline Burst Cache Module $22.00 (Coast Celp)
- 512K (160 pin) Pipeline Burst Cache Module $39.00 (Coast Celp)
- 256K (160 pin) Async Cache Module – $59.00 compatible with IBM Aptiva A&M Series
- 256K (160pin) Async Coast Module – $29.00

	12NS	15NS	20NS	25NS
32Kx8	9.00	4 50	4.25	4 00
64Kx1	–	11.00	–	–
64Kx8	–	15.00 (5V)	–	–
128Kx8	–	29.50	26.00	24.00

Individual D-RAM Chips

	40NS	50NS	60NS	70NS	80NS
1Megx1	–	–	5.00	4.00	2 00
1Megx4	–	–	19.00	18.00	17.00
1Megx4 (Zip Pk)	–	–	12.00	11.00	10.00
256x4(Page Dip)	–	–	7.25	6.75	6.50
256x4(Page Zip)	–	–	9.25	9.00	8 95
256x4(Video Zip)	–	–	–	10.95	9 95
256x8(SDJ)	–	–	12 00	11.00	–
256x16 SDJ	34.00	29.00	29 00	19.00	–
256x16 SDJ Edo	–	–	29.00	–	–
256x16 Video Zip	–	–	–	29.00	–

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Matrox Millennium	2Meg/4Meg/6Meg WRAM	89/159/229
Matrox Mystique	2Meg SGRAM	59
ATI 3D Pro Turbo	2Meg/4Meg	89, 179
ATI Xclaim 3D	4Meg SGRAM	179
ATI 3D Xpression	2Meg SDRAM	79
Apple PowerMac 4400	2Meg/4Meg	89/139
NEC Powermate Pro 150, 220	2Meg./6Meg WRAM	129, 259
HP Vectra XV/6, VT/6, VA, XA	2Meg/6Meg WRAM	129, 259
Compaq 1Meg Video 213922-001	1Meg	69
Compaq Deskpro 2000, 4000, 6000	2Meg/6Meg WRAM	129/299

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GATEWAY MEMORY

Dest Big Screen D5 – SDRAM	8Meg/16Meg/32Meg/64Meg	49/89/159/399
Dest Big Screen D6 – EDD (pairs)	4Meg/8Meg/16Meg/32Meg	24/44/68/139
Family PC w/MMX – SDRAM	8Meg/16Meg/32Meg/64Meg	49/89/159/399
G5-166, 20D Prof. System – SDRAM	8Meg/16Meg/32Meg/64Meg	49/89/159/399
G5-166M, 20DM MMedia System – SDRAM	8Meg/16Meg/32Meg/64Meg	49/89/159/399
G6-200 Prot System – SDRAM	16Meg/32Meg	119/219
G6-Prot, M MMedia System – EDD	4Meg/8Meg/16Meg/32Meg	24/44/68/139
Multimedia G-5 Systems – SDRAM	8Meg/16Meg/32Meg/64Meg	49/89/159/399
Prot, P-5 Series – SDRAM	8Meg/16Meg/32Meg/64Meg	49/89/159/399

We Carry All GATEWAY Memory

NEC MEMORY

Ready 5010, 7010, 7020, 9010, 9022 / Ready 9510, 9520, 9522, 9530, 9532 / Ready 7022 (E00)
Image P60, P90, 0, P100E
(Pairs) 4Meg/8Meg/16Meg/32Meg — 22/39/66/129 — We Carry All NEC Memory

HEWLETT PACKARD MEMORY

Netserver 4/66LC-5/133LC (pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Netserver LE 486SX33 – 486DX266	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Netserver LH Plus 5/133, 5/166 (EDD, ECC)	16Meg/32Meg/64Meg/128Meg	99/189/409/875
Netserver 4/33LM – 5/100LM (pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Netserver 5/75LS – 5/133 LS4 (pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Pavillion 5D1D-717D (pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Vectra 500 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Vectra VA 6/180, 6/200 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Vectra VE2 5/75 – 5/133 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Vectra XA 6/180, 6/200 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Vectra XM4 Series	4Meg/8Meg/16Meg/32Meg	22/42/59/119

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IBM APTIVA, PC, P/S1 & P/S2

Aptiva 300, 500 Series	4Meg/8Meg/16Meg/32Meg	20/39/59/129
Aptiva 700 Series (pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
Aptiva A Series (pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
Aptiva C Series (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
Aptiva M Series	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 330 Models 6571-6576	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 330 Model 6577 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 340 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 35D Models 6581-6585	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 35D Model 6586 (pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 35D Model 6587 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 360	4Meg/8Meg/16Meg/32Meg	28/54/69/139
PC 730 Models 6875-6876 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
PC 73D Model 6877 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 750 Models 6885-6886 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
PC 750 Model 6887 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC Server 310 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
PC Server 500 (ECC, pairs)	4Meg/8Meg/16Meg/32Meg	59/79/119/249
P/S 1, 3D Pin Simms	1/Meg/4Meg	12/34
P/S 1, 72 Pin Simms	4Meg/8Meg/16Meg/32Meg	28/54/69/139
P/S 2, 55SX, 65SX	4Meg	39
P/S 2, 53, 53LS, 56, 57	4Meg/8Meg	39/69
P/S 2, 95XP (ECC, pairs)	4Meg/8Meg	49/79
P/S 2 Server, 95, 195, 295 (ECC, pairs)	4Meg/8Meg/16Meg/32Meg	59/79/119/249

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IBM NOTEBOOK & LAPTOP MEMORY

MDOEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Thinkpad 340, 345, 355, 360, C, CE	4Meg/8Meg/16Meg	49/79/139	129.00
Thinkpad 365C, CS, CD, E, ED	4Meg/16Meg	39/119	129.00
Thinkpad 365X, 365X0	8Meg/16Meg/32Meg	59/119/269	129.00
Thinkpad 380, 3800, 3850	8Meg/16Meg/32Meg64Meg	79/139/239549	129.00
Thinkpad 500, 510CS	4Meg/8Meg/16Meg	59/79/139	189.00
Thinkpad 560, 560E	8Meg/16Meg/32Meg/64Meg	59/119/269/529	
Thinkped 700, 720, 750, CL57SX	4Meg/8Meg/16Meg/32Meg	39/79/159/268	179.00
Thinkped 701, 701C, 701CS	4Meg/8Meg/16Meg/32Meg	39/64/119/299	109.00
Thinkpad 730T, TE	4Meg/8Meg/16Meg	49/89/139	110.00
Thinkpad 755C, CE, C0, CS	4Meg/8Meg/16Meg/32Meg	39/79/129/259	159.00
Thinkped 760C, CD, L, LD	4Meg/8Meg/16Meg/32Meg	39/69/119/299	159.00
Thinkped 760E, ED, EL, ELD	8Meg/16Meg/32Meg	59/119/269	159.00
Thinkpad 760X0, 760XL	8Meg/16Meg/32Meg/64Meg	79/129/279/549	159/269
Thinkpad 765D, 765L	8Meg/16Meg/32Meg64Meg	79/129/279/549	159/269
Thinkpad 77D (SDRAM)	16Meg/32Meg/64Meg		149/319/649

COMPAQ MEMORY MODULES

Deskpro 486/25, 33L, 50L	2Meg/8Meg/32Meg	29/79/199
Deskpro 3/25I, 33I, 4/25IS, 66I	2Meg/4Meg/8Meg	19/39/69
Deskpro 386, 486 M Series	2Meg/4Meg/8Meg	29/39/69
Deskpro M Series Expansion Board	0K (no memory)	119 00
Deskpro 450, 4100, 575, 590, 5100, 5133	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Deskpro 575, 5120, 5133, 5150, 5160 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Deskpro 2000, 4000, 6000 Series (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Deskpro 5/60M, 5/66M, XE56D (quads)	2Meg/4Meg/8Meg/16Meg/32Meg	19/28/54/69/139
Deskpro XL (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
Deskpro XL 6150, 6200 (ECC, pairs)	8Meg/16Meg/32Meg/64Meg, 128Meg	Call
Deskpro 2000, Presario 4112, 4122, 4712, 4716, 5526, 5528	1Meg Video	39
Presario 5536, 9232, 9234, 9240, 9250, 9260, 9642, 9660	1Meg Video	39
Presario 510, 520, 524, 660, 720, 724, 860	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 92D, 924, 954, 974, 978, 992	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 833, 850, 860, 866	4Meg/8Meg/16Meg/32Meg	39/64/119/239
Presario 12D7, 1210, 1610	4Meg/8Meg/16Meg/32Meg	Call
Presario 5528, 7110, 7152	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 7170, 7180, 9536, 9546, 9548, 9564 (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 9232, 9234, 9240, 925D, 9642, 9660 (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Proliant 1000 5/60, 2000, R, 4000, R (quads)	4Meg/8Meg/16Meg/32Meg	19/28/54/69
Proliant 1500, 1500R (pairs)	4Meg/8Meg/16Meg/32Meg	36/62/99/189
Proliant 4500, 4500R (quads)	4Meg/8Meg/16Meg/32Meg/64Meg	39/64/119/239/599
Proliant 5000, 5000R (pairs)	32Meg/64Meg/128Meg/256Meg	Call
Prolinea 4/25S, 4/33, 4/66	2Meg/4Meg/8Meg	29/39/69
Prolinea (enhanced), MT	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 575, 590, 5100, 5120, 5133 (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 5100, 5120, 5133, 5150, 5166 (EDD pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 575E, 100E, 120E, 575MX (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 590MX, 5120MX (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 6150E, 6180E (pairs)	8Meg/16Meg/32Meg	39/59/119
Prosignia 300 5/75, 5/90, 5/120, 5/150 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
Prosignia 500 5/90, 5/120, 5/150 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139

COMPAQ NOTEBOOK/LAPTOP MEMORY

MDOEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Armade 1100, 1120T, 1120, 1125	8Meg/16Meg/32Meg/64Meg	69/129/229/549	119.00
Armada 1130, 1130T (pairs)	4Meg/8Meg/16Meg	49/69/129	119.00
Armada 1510DM, 1520DM, 1550DMT	16Meg/32Meg/64Meg	139/239/579	
Armada 4100, 4110, D, 4120, T, 4130T, 4131T	8Meg/16Meg/32Meg	69/129/239	
Armada 7710MT, 7730MT, 7750DMT	16Meg/32Meg/64Meg	139/239/579	
Concerto 4/25, 433	4Meg/8Meg/16Meg	49/79/124	139.00
Contura 4/25, 4/25C, 4/25CX	4Meg/8Meg/16Meg	49/79/129	109.00
Contura 400C, 400CX, 410C, 410CX	4Meg/8Meg/16Meg	49/79/134	109.00
Contura 420C, 420CX, 430C, 430CX	4Meg/8Meg/16Meg/24Meg	49/79/134/199	109.00
Contura Aero	4Meg/8Meg/16Meg	39/79/139	109 00
LTE 5000, 5100, 5200, 5300	8Meg/16Meg/32Meg/64Meg	69/129/249/469	139.00
LTE Elite 440C, CX, 4/75CX	4Meg/8Meg/16Meg/24Meg	49/69/139/199	139.00
LTE Lite 425	4Meg/8Meg/16Meg	49/79/136	195.00
Presario 1000, 1010, 1020, 1030, 1070, 1080	8Meg/16Meg/32Meg	59/119/229	119.00

DELL MEMORY

Dimension XPS M166S, M2090, P133s, 166s, 200s, P133v, 166v, 200v	8Meg/16Meg/32Meg	55/99/199
Dimension XPS P60, P75, P90, P100 (pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Dimension XPS P100c, 120c, 133c, 166c, XPS P75T, 100T (pairs) FPM or EDD	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Dimension XPS Pro 150, Pro 200 (quads)	4Meg/8Meg/16Meg/32Meg	39/69/102/209
Dimension XPS Pro 150n, 180n, 200n (Edo pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Optiplex GL, GM, GMT (Edo pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Optiplex GS, GXL, GXM, GXMT (Edo pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Optiplex GXt, GXpro, 6180, 6200 (Edo, Ecc)	16Meg/32Meg/64Meg/128Meg	119/229/469/999
PowerEdge 2100, 410D (Edo, Ecc)	16Meg/32Meg/64Meg/128Meg/256Meg	119/224/469/999/2499

LASER PRINTER MEMORY UPGRADES

AMDUNT UPGRADED	DK Bd	256k	1	2	3	3.5	4	5	6	8	16	32
Brother 630, 631, 641, 645	–	–	39	59	–	–	–	–	–	–	–	–
Canon LBP 430	–	–	19	–	–	–	49	–	–	–	–	–
Canon LBP 860, 1260	–	–	–	19	–	–	49	–	–	59	79	139
Epson Action Laser 110D, 1600	–	–	19	29	–	–	49	–	–	69	89	–
Epson Action Laser II	–	–	74	–	123	–	–	180	–	–	–	–
Epson 8000, 1800, 4000, 4100, 4300	–	–	74	–	123	–	–	180	–	–	–	–
Epson 1000, 1500, 5000, 5200	–	–	–	49	–	–	98	–	–	–	–	–
HP 2, 2D–	–	–	–	59	–	–	79	–	–	–	–	–
HP 3, 3D, 3P, 2P+	–	–	–	59	–	–	89	–	–	–	–	–
HP 4, 4M, 4SI, 4SIMX	–	–	–	19	–	–	39	–	–	69	–	–
HP 4L	–	–	29	–	–	–	–	–	–	–	–	–
HP 4MP, 4P	–	–	9	19	–	–	34	–	–	59	–	–
HP 4+, 4M+, 4V, 4MV	–	–	9	19	–	–	34	–	–	59	79	139
HP 5, 5M, 5MP, 5N, 5P, 5SI, 5MX	–	–	9	19	–	–	34	–	–	59	79	139
HP 5L, 6L	–	–	–	–	–	–	49	–	–	99	–	–
HP 6MP, 6P	–	–	9	19	–	–	34	–	–	59	79	139
HP Design Jet 200, 220	–	–	–	–	–	–	39	–	–	69	–	–
HP Design Jet 230, 250C	–	–	–	–	–	–	39	–	–	69	89	149
HP Design Jet 330, 350C	–	–	–	–	–	–	39	–	–	69	89	149
HP Design Jet 600, 650C	–	–	–	–	–	–	39	–	–	69	–	–
HP Design Jet 650C PS	–	–	–	–	–	–	39	–	–	69	89	149
HP Design Jet 700, 750C, Plus, 755	–	–	–	–	–	–	39	–	–	69	89	149
HP Deskjet 500, 500C, 510, 550,560	–	29	–	–	–	–	–	–	–	–	–	–
HP Deskjet 1200C, 1200C/PS, 1600C,1600CM	–	–	–	–	–	–	39	–	–	69	–	–
IBM Laser 4D19, 4019E	–	–	–	–	–	109	–	–	–	–	–	–
IBM Laser 4029, 4037	–	–	–	–	–	–	49	–	–	–	–	–
IBM Laser 4039, 4079	–	–	–	39	–	–	69	–	–	99	–	–
Lexmark, Optra L, LX, R, RX	–	–	–	–	–	–	39	–	–	59	89	149
Lexmark Valuwriter 300,600	–	–	29	39	–	–	69	–	–	–	–	–
Lexmark Winwriter 200, 400, 600	–	–	29	39	–	–	69	–	–	–	–	–
NEC 90, 290	–	–	–	89	–	–	–	–	–	–	–	–
NEC 95, 97	–	–	–	59	–	–	–	–	–	–	–	–
Oki 400E, 400EX, 410E, 410EX	–	–	67	89	169	–	189	–	–	–	–	–
Oki 810E, EX, 600E, EX, 61DE, EX	–	–	29	79	–	–	119	–	–	149	229	–
Panasonic 4420/4450I	–	–	–	79	–	–	109	–	–	–	–	–
Panasonic 4410/4430	–	–	–	59	–	–	99	–	–	–	–	–
Panasonic 4450	–	–	89	–	–	–	–	–	–	–	–	–
Panasonic 4400/5400	–	–	49	69	–	–	109	–	–	–	–	–
Panasonic 4440, 5410	–	–	69	–	–	–	109	–	–	–	–	–
Panasonic 6500	–	–	14	14	–	–	69	–	–	–	–	–
Sharp 9400, 946D, 9600, 9700E	–	–	49	69	–	–	119	–	–	–	–	–
Sharp 9500, E, H, 970D, H	–	–	49	–	–	–	236	–	–	–	–	–

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Canon Innova Book 350, 360, 475	134	NEC Versa S	99
Compaq Contura 3/25, 4/25	109	Sharp 3010, 3020, 305D, 3060, 315D	129
Compaq Aero, 400, 410, 420, 430	109	Sharp 8700, 8800, 8900	129
Compaq LTe 5000 Series	139	TI Exstensa 450, 455, 51D, 515	139
Epson Action Note 650, 660	119	TI Exstensa 550, 555, 560, 570	149
Epson Action Note 8D0, 866, 880, 910	119	TI Exstensa 6D0, 6D5, 650	169
IBM Thinkpad 355, 360	119	Toshiba 400, 405, 410, 415, 420, 425, 430 (NIMH)	219
IBM Thinkpad 365 C, E0, XD	129	Toshiba 100, 105, 110, 115, 20D, 205	105
IBM Thinkpad 701	109	Toshiba 2100 Series	99
IBM Thinkpad 75D, 755	179	Toshiba 2400, 2450, 1900, 1950, 1960	109
IBM Thinkpad 755 CD, CE, CV, CX	179	Toshiba 4700, 4800, 485D, 4900	109
NEC Versa 2400, 2405, 2430, 2435	159	Toshiba T4500, T4600	159

TOSHIBA LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Libretto 50CT	8Meg/16Meg/32Meg/48Meg/128Meg	69/118/229/369/1049	
Dynapad T200, T200CS		Call	
Tecra 500COT, CS, 510COS, COT	8Meg/16Meg/32Meg/48Meg/128Meg	69/118/243/Call/Call	259 00
Tecra 520CDT, 530CDT	8Meg/16Meg/32Meg/48Meg/128Meg	69/118/243/Call/Call	259.00
Tecra 700CS, 700CT (SDRAM)	8Meg/16Meg/32Meg	79/129/229	279 00
Tecra 710CDT, 720CDT, 730CDT	8Meg/16Meg/32Meg/64Meg/128Meg	79/129/239/539/1079	279.00
Tecra 730XCDT, 740CDT	8Meg/16Meg/32Meg/64Meg/128Meg	79/129/239/539/1079	279 00
T2000SXE	8Meg	94	170.00
T2100 Series	4Meg/8Meg/16Meg/24 Meg	39/59/119/189	119.00
T1900, T4500, T4600, T4700, T4900 All Models	4Meg/8Meg/16Meg/32Meg	39/79/129/239	109 00
T2400, T3400, T3400CT, T3600	4Meg/8Meg/16Meg	49/69/119	119 00
Satellite T100CS, 105CS, 110CS, 110CT, 115CS	8Meg/16Meg/32Meg	74/129/239	119 00
Satellite 200COS, 205COS Series	8Meg/16Meg/32Meg	79/129/239	119.00
Satellite 220COS	8Meg/16Meg/32Meg/48Meg/128Meg	79/129/249/369/1079	
Satellite T400 Series, T600 Series	8Meg/16Meg/32Meg	79/129/239	229 00
Portege 300	16Meg/32Meg	129/239	
Portege 610CT, 620CT, 650CT, 660CT	8Meg/16Meg/32Meg/64Meg	79/139/249/539	265.00

NOTEBOOK, LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
ACERNote 730C, 735C, 760C, 760CX, 780CX	4Meg/8Meg	59/89	129.00
ACERNote 763, 765, 782, 784, 786	4Meg/8Meg/16Meg	39/69/119	
ACERNote Light 350, 352, 355	4Meg/8Meg/16Meg	49/69/129	179.00
ACERNote Light 356, 358, 359, 361 (pairs) edo	4Meg/8Meg/16Meg	49/69/129	179.00
ACERNote Nuovo 971, 972, 372, 373, 374	8Meg/16Meg/32Meg	69/125/239	
ACERNote Pro 950, 954, 955, 957, 959 (pairs)	4Meg/8Meg/16Meg	59/79/129	
Ambra SN Series	4Meg/16Meg	69/149	120.00
Ambra N-75, N-100	4Meg/8Meg/16Meg	49/79/139	139.00
AST Ascentia A41, A42	8Meg/16Meg/32Meg/64Meg	79/139/269/629	179.00
AST Ascentia P30, P50	8Meg/16Meg/32Meg	79/149/269	
AST Ascentia J10, J30,J50 (pairs)	8Meg/16Meg/32Meg/64Meg	79/129/249/359	189.00
AST Ascentia 800N, 810N, 900N, 910N	8Meg/16Meg	79/129	129 00. 195.00
AST Ascentia 950N	8Meg/16Meg	79/139	199.00
AST Bravo & Explorer	4Meg/16Meg	79/139	155.00
AT&T Globalyst 130, 200, 250	4Meg/8Meg/16Meg	49/79/119	139 00
Austin 0X4, DX2, SX2, SX Series	4Meg/16Meg	69/189	159.00
Austin Edge CD P-133 edo	8Meg/16Meg	89/149	
Austin Edge Ouet (pairs) edo	16Meg/32Meg	79/139	
Canon 1100, 300P (pairs)	4Meg/8Meg/16Meg	59/79/129	129.00
Canon Innova Book 150, 175	4Meg/16Meg	59/139	129 00
Canon Innova Book 350CD, 36D, 475	8Meg/16Meg	59/119	
Canon Innova Book 480, 490 edo	8Meg/16Meg	69/119	139 00
CTX EZ Book 500, 600, 700 Pent, Series	4Meg/8Meg/16Meg	59/89/1	149 00
DEC HiNote	4Meg/8Meg/16Meg	59/89/139	129.00
DEC HiNote Ultra, Ultra II	4Meg/8Meg/16Meg/32Meg	39/69/119/239	
DEC HiNote VP 520, 525, 535, 545 (pairs)	4Meg/8Meg/16Meg	39/69/119	129 00
DEC HiNote VP 5100, 5120	8Meg/16Meg/32Meg/64Meg	69/119/219/669	129.00
DEC HiNote VP, Css, LSS, CTS, LTS	8Meg/16Meg/32Meg/64Meg	69/119/219/669	
Dell Lattitude LM (pairs)	4Meg/8Meg/16Meg	39/69/129	
Dell Lattitude 433, C, CX	4Meg/16Meg	59/129	
Dell Lattitude LX, M	4Meg/8Meg/16Meg	49/79/139	129 00
Dell Latitude XP, XPI	4 Meg/8Meg/16Meg	44/69/119	
Epson ActionNote 650, 650c, 660c, 660cx	4Meg/8Meg/16Meg	39/79/139	119 00
Epson ActionNote 880, 866c, 890, 910	4Meg/8Meg/16Meg/20Meg	39/69/134/199	139.00
Epson ActionNote 4LC/25, 4LC/33, 4SLC/2-50, 4000	6Meg	69.00	90.00
Fujitsu Litebook 500, 600 Series edo	8Meg/16Meg/32Meg	69/139/269	
Fujitsu Monte Carlo, Montego, Milan	8Meg/16Meg/32Meg	69/139/269	
Gateway 2000 Colorbook 4/33	4Meg/16Meg	69/179	135.00
Gateway 2000 486 Handbook or Liberty	4Meg/16Meg	49/139	
Gateway 2000 Solo Series (pairs)	4Meg/8Meg/16Meg	69/89/139	
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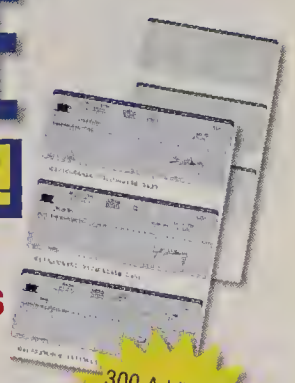

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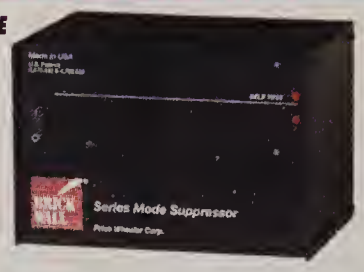

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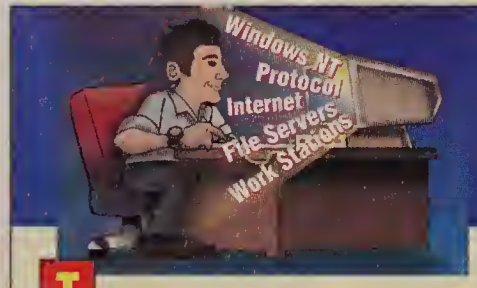

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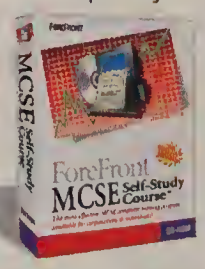

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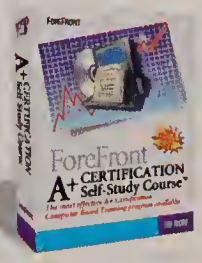

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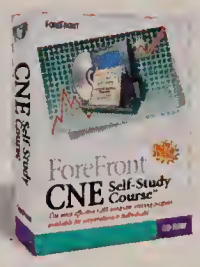

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PC 350 Models 8581-6585	4Meg-8Meg-18Meg-32Meg	30-55-95-185
PC 350 Model 8586 (pairs)	4Meg-8Meg-16Meg-32Meg	30-55-95-185
PC 350 Model 8587 (EDD,pairs)	4Meg-8Meg-16Meg-32Meg	30-55-95-185
PC 360	4Meg-8Meg-16Meg-32Meg	30-55-95-185
PC 730 Models 8875-8878 (pairs)	4Meg-8Meg-16Meg-32Meg	30-50-90-170
PC 730 Model 6877 (EDD,pairs)	4Meg-8Meg-16Meg-32Meg	30-50-90-170
PC 750 Models 6885-6886 (pairs)	4Meg-8Meg-18Meg-32Meg	30-50-90-170
PC 750 Model 8887 (EDO,pairs)	4Meg-8Meg-16Meg-32Meg	30-50-90-170
PC Server 310 (pairs)	4Meg-8Meg-16Meg-32Meg	30-50-90-170
PC server 500 (ECC,pairs)	4Meg-8Meg-16Meg-32Meg	55-90-165-295
P-S 1,30 Pin Simms	1-Meg-4Meg	15-30
P-S 1,72 Pin Simms	4Meg-8Meg-18Meg-32Meg	35-59-95-195
P-S 2,55SX 85SX	4Meg	40
P-S 2,53 53LS,56,57	4Meg-8Meg	40-65
P-S 2,95XP (ECC,pairs)	4Meg-8Meg-16Meg-32Meg	55-90-185-295
P-S Server,95,195,295 (ECC,pairs)	4Meg-8Meg-16Meg-32Meg	55-90-165-295

IBM NOTEBOOK MEMORY

MODEL	MEMORY	PRICE
Thinkpad 345,355, C, CE	4 Meg-8Meg-16Meg	60-90-125
Thinkpad 340	4 Meg-8Meg	40-80
Thinkpad 365C,CS,CD,E,ED	4Meg-18Meg	40-120
Thinkpad 365X,365XD	8Meg-16Meg-32Meg	65-120-265
Thinkpad 500	4Meg-8Meg	65-85
Thinkpad 510CS	8Meg-16Meg-32Meg	65-85-135
Thinkpad 580	8Meg-16Meg-32Meg	85-115-265
Thinkpad 700,720	4Meg-8Meg	99-145
Thinkpad 701,701C	4Meg-8Meg-16Meg-32Meg	CALL
Thinkpad 730T,TE	4Meg-8Meg-16Meg	65-90-125
Thinkpad 750, C, CS, P	4Meg-8Meg-16Meg-32Meg	99-145-175-320
Thinkpad 755C,CE,CD,CS	4Meg-8Meg-16Meg-32Meg	60-90-125-275
Thinkpad 760C,CD,L,D,	8Meg-18Meg-32Meg	80-135-299
Thinkpad 780E,ED,EL,ELD	8Meg-16Meg-32Meg	65-115-265

COMPAQ MEMORY

MODEL	MEMORY	PRICE
Deskpro 486-25,33L,50L	2Meg-8Meg-32Meg	75-115-245
Deskpro 3-25I,33I,4-25IS,66I	2Meg-4Meg-8Meg	30-55-75
Deskpro 386 486 M Series	2Meg-4Meg-8Meg	30-55-75
Deskpro M Series Expansion Board	OK (no memory)	110
Deskpro 450,4100,590,5100,5133	4Meg-8Meg-16Meg-32Meg	30-69-120-210
Deskpro 575,5120,5133,5150,5160 (EDO,pairs)	4Meg-8Meg-16Meg-32Meg	30-69-120-210
Deskpro 2000,4000 6000 Series EDO,pairs)	4Meg-8Meg-16Meg-32Meg	30-50-90-169
Deskpro 5-60M,5-66M,XE560 (quads)	4Meg-8Meg-16Meg-32Meg	30-69-115-399
Deskpro XL (pairs)	4Meg-8Meg-16Meg-32Meg	35-60-105-215
Deskpro XL 6150,6200 (ECC,pairs)	8Meg-16-Meg-32Meg-64Meg-128Meg	CALL
Presario 510,520,524,660,720,724 860	4Meg-8Meg-16Meg-32Meg	30-55-95-185
Presario 920 924,954 974 978,992	4Meg-8Meg-16Meg-32Meg	30-55-95-185
Presario 833,850,860,866	4Meg-8Meg-16Meg-32Meg	40-65-110-220
Presario 5528,7110,7152	4Meg-8Meg-16Meg-32Meg	35-55-95-185
Presario 7170,7180,9538,9546,9548,9564 (pairs)	4Meg-8Meg-16Meg-32Meg	35-55-95-185
Presario 9232,9234,9240,9250,9642,9660 (pairs)	4Meg-8Meg-16Meg-32Meg	40-65-110-220
Proliant 1000 5-60,2000,R,4000,R (quads)	4Meg-8Meg-16Meg-32Meg	35-60-105-215
Proliant 1500,1500R (pairs)	4Meg-8Meg-16Meg-32Meg	35-60-105-215
Proliant 4500,4500R (quads)	8Meg-16Meg-32Meg-64Meg	65-115-200-420
Proliant 5000,5000R (pairs)	32Meg-64Meg-128Meg-256Meg	CALL
Prolinea 4-25S,4-33,4-66	2Meg-4Meg-8Meg	30-55-75
Prolinea (enhanced) MT	4Meg-8meg-16Meg-32Meg	35-60-105-215
Prolinea 575,590,5100,5120,5133 (pairs)	4Meg-8Meg-16Meg-32Meg	35-55-95-185
Prolinea 5100,5120,5133,5150,5166 (EDO pairs)	4Meg-8Meg-16Meg-32Meg	35-55-95-185
Prolinea 575E 100E,120E,575MX (pairs)	4Meg-8Meg-16Meg-32Meg	35-55-95-185
Prolinea 590MX,5120MX (pairs)	4Meg-8Meg-16Meg-32Meg	35-55-95-185
Prolinea 6150E,6180E (pairs)	4Meg-8Meg-16Meg-32Meg	35-55-95-185
Prosignia 300,5-75,5-90,5-120,5-150 (pairs)	4Meg-8Meg-16Meg-32Meg	35-60-105-215
Prosignia 500 5-90,5-129,5-150 (pairs)	4Meg-8Meg-16Meg-32Meg	35-60-105-215

COMPAQ NOTEBOOK MEMORY

MODEL	MEMORY	PRICE
Armada 1120,T	8Meg-16Meg-32Meg	65-130-310
Armada 4100,4110,4120,4130	8Meg-16Meg-32Meg Kit	70-120-240
Concerto 4-25,433	4Meg-8Meg-16Meg	59-79-129
Contura 4-25,C,CX	4Meg-8Meg-16Meg	45-75-120
Contura 400C,400CX,410C,410CX	4Meg-8Meg-16Meg	60-85-135
Contura 420C,420CX,430C,430CX	4Meg-8Meg-16Meg-24Meg	60-85-135-199
Contura Aero 4-25,4-33	4Meg-8Meg-16Meg	60-80-130
LTE 5000,5100,5200,5300	8Meg-16Meg-32Meg-64Meg Kit	75-120-230-445
LTE Elite 4140C,CX,4-75CX	4Meg-8Meg-18Meg-24Meg	60-80-130-205

TOSHIBA NOTEBOOK MEMORY

MODEL	MEMORY	PRICE
Tecra 500, 510 CDS/CDT	8Meg-16Meg-32Meg-64Meg	75-125-240-350
Tecra 700 (SDRAM)	8Meg-16Meg-32Meg	105-169-240
Tecra 710, 720, 730, CDT	8Meg-16Meg-32Meg-64Meg-128Meg	80-135-240-570-1155
T2000SXE-2200SX-T1800, 1850, C	4Meg-8Meg	75-115
T2100, 2105, 2155, 2110, 2115	4Meg-8Meg-16Meg-24Meg	50-75-125-180
T4500, C, T4600, T4700,T1900, T1910, T1950 (3 3v)	4Meg-8Meg-16Meg	60-80-135
T4850,T4850CT, T4900, T4900CT	4Meg-8Meg-16Meg-32Meg	60-80-135-260
T3400CT, T2400, T3600	4Meg-8Meg-18Meg	40-65-130
T100, 105, 110, 115	8Meg-16Meg-32Meg	80-135-240
T400, 405, 410, 415 420, 425	8Meg-16Meg-32Meg	80-135-240
T400CS, 400CDT, 105EDD	8Meg-16Meg-32Meg	80-135-240
T600, 610, CT EDD	8Meg-16Meg-32Meg	80-135-240

NOTEBOOK MEMORY

MODEL	MEMORY	PRICE
ACERNote 730C, 735C, 760C, 760CX, 780CX	4Meg-8Meg	45-70
ACERNote 763, 765, 782, 784, 786	4Meg-8Meg-16Meg	40-65-115
ACERNote Light 350, 352, 355	4Meg-8Meg-16Meg	40-65-115
ACERNote Light 358, 358, 359, 361(pairs)	4Meg-8Meg-16Meg	35-65-125

NOTEBOOK MEMORY

MODEL	MEMORY	PRICE
ACERNote Pro 950, 954, 955, 957, 959(pairs)	4Meg-8Meg-16Meg	35-60-105
Ambra N Series	4Meg-6Meg-12Meg-16Meg	85-105-135-185
Ambra N-75, N-100	4Meg-8Meg-18Meg	45-85-165
AST Ascentia P30, P50	8Meg-16Meg-32Meg	79-145-299
AST Ascentia J10, J30, J50 (install pairs)	8Meg-16Meg-32Meg	65-105-CALL
AST Ascentia 900N, 800N, 810, 910	4Meg-8Meg-16Meg	70-85-130
ASTBravo & Explorer	4Meg-16Meg	55-110
AST Prem Exec 386SX-20-25-25L	4Meg	50
AST Power Exec 3-25, 425EL, 425SL	4Meg-16Meg	65-140
AST Power Exec 4-33SL	4Meg-16Meg	65-140
AT & T Globalyst 130	4Meg-8Meg-16Meg	40-65-135
AT & T Globalyst 250, 250P	4Meg-8Meg-18Meg-32Meg	85-120-155-265
AT & T Globalyst 200S	8Meg-16Meg	105-189
Cannon Innova Book 150, 175	4Meg-16Meg	65-135
Cannon Innova Book 200LS	4Meg-8Meg-16Meg-24Meg	65-95-215-345
Cannon Innova Book 350C0, 360, 475	8Meg-16Meg	65-115
Cannon Innova 486-10	4Meg-16Meg	75-215
CTX EZ Book 5x86 Pent. Series	4Meg-8Meg-16Meg	40-65-115
OEC HiNote, Ultra HiNote	4Meg-8Meg-16Meg	40-80-115
OEC HiNote VP	8Meg-16Meg-32Meg	65-125-245
DEC Latitude LM (pairs)	4Meg-8Meg-16Meg	55-95-185
DEC Latitude 433, C, CX	4Meg-16Meg	75-195
OEC Latitude LMP (pairs)	4Meg-8Meg-16Meg	75-115-195
OEC Latitude LX, M	4Meg-8Meg-16Meg	75-115-195
OEC Latitude XP, XPI	4Meg-8Meg-16Meg	75-115-195
Epson ActionNote 650, 850C, 660C, 660CX	4Meg-8Meg-16Meg	55-85-125
Epson ActionNote 700, 700C, 700CX	4Meg-16Meg	75-185
Epson ActionNote 880, 866C, 890	4Meg-8Meg-16Meg	45-75-165
Epson ActionNote 4LC-25, 4LC-33, 4SLC-2-50, 400	6Meg	60
Everex Tempo LX, LX20, Carrier	2Meg	85
Fujitsu Monte Carlo	8Meg-16Meg-32Meg	65-120-265
Gateway 2000 Colorbook 4-33	4Meg-16Meg	65-175
Gateway 2000 Nomad 425 DXL-SXL	4Meg-16Meg	155-755
Gateway 2000 486 Handbook or Liberty	4Meg-16Meg	55-165
Hitachi C-Series	8Meg-16Meg-32 Meg	80-145-325
Hitachi M-Series	8Meg-16Meg	100-150
HP Omnibook 300, 480, 425	4Meg	70
HP Omnibook 530, 600	4Meg-8Meg-12Meg	60-85-115
HP Omnibook 4000	4Meg-8Meg-16Meg	65-89-139
HP Omnibook 5000	8Meg-16Meg-32Meg	85-135-225
HP Omnibook 6000	4Meg-8Meg	65-110
Leading Edge Aviva 2000	4Meg-16Meg	65-175
Lexmark SE10	4Meg	65
Magnavox Metalis	4Meg	115
Micron Transport Pentium	8Meg-16Meg	115-215
Midwest Micro Elite or Soundbook	4Meg-8Meg-16Meg	75-115-195
Midwest Micro Elite or Soundbook Plus or Soundbook II, IIP	4Meg-8Meg-16Meg	75-115-195
Midwest Micro Elite or Soundbook CD	4Meg-8Meg-16Meg	75-115-195
NCR Safari 3180, 3181	4Meg-8Meg-18 Meg	85-119-155
NEC Ultralite Versa, E, V, MP	4Meg-8Meg-16Meg-32Meg	85-119-155-265
NEC Versa, S, Versa 2000 & 20000, 500	4Meg-8Meg-16Meg	40-75-115
NEC Versa 4000, 4050-4080	4Meg-8Meg-16Meg-32Meg	85-119-155-285
NEC Versa 6000	8Meg-16Meg-32Meg-64 Meg	90-145-245-495
Olivetti Echos P75-P1335 (pairs)	4Meg-8Meg-16Meg	35-60-105
Packard Bell Statesman	2Meg-8Meg	40-60
Panasonic CF-V21P, CF-V41	4Meg-8 Meg-16Meg	80-105-155
Panasonic CF-580, CFV21PSX	4Meg16Meg	65-149
Samsung Sens 810	8Meg-16Meg	CALL
Sanyo 17-18 N8	2Meg	85
Sharp 3030, 3070	8Meg-16Meg	79-145
Sharp 6781, 6881, 6785, 6700, 6800, 6741	2Meg-4Meg	45-60
Sharp 8150, 8650, 8660, 7700, 7760	4Meg-16Meg	60-130
Sharp 8700, 8800, 8900	4Meg-8Meg-18Meg	65-90-140
Sharp 3010, 3020, 3050, 3060	4Meg-8Meg-16Meg	40-65-115
Sharp 9000, 9030	8Meg-16Meg-32Meg	85-130-255
Sharp 9040, 9070 (pairs)	4Meg-8Meg-16Meg	40-65-115
TI 4000, 4000E, 4000M	4Meg-16Meg	140-715
TI 5000, 5100, 5200, 5300	8Meg-16Meg	85-140
TI 6020, 6030	8Meg-16Meg-32Meg	70-120-315
TI Extensa, 450, 450T, 455, 455T, 570	4Meg-8Meg-16Meg	40-65-115
TI Extensa, 550, 555, 560, 580 (pairs)	4Meg-8Meg-16Meg	35-60-110
Winbook XP	16Meg-32Meg	185-335
Zenith Master Sport SL, SLE, 600, 620, 625NL	2Meg	45
Zenith Z-Note 425LN, LNC, LNP	4Meg	70
Zenith Z-Note MX	4Meg-8Meg-16Meg	60-90-150
Zenith Z-Star 4-33	2Meg-8Meg	40-70
Zenith Z-Star EX	4Meg-8Meg-16Meg	40-65-115

LASER PRINTER MEMORY

AMOUNT UPGRADED	0KB	256k	1	2	3	3.5	4	5	6	8	16	32
Brother 630, 631,641,645	—	—	45	65	—	—	—	—	—	—	—	—
Cannon LBP 430	—	—	25	—	—	—	35	—	—	—	—	—
Cannon LBP 860, 1260	—	—	25	35	—	—	45	—	—	90	125	199
Cannon LBP4, 4Lite, 4plus	—	—	115	155	—	—	—	—	—	—	—	—
Epson 6000, Action Laser	—	—	—	110	—	—	169	—	—	—	—	—
Epson Action Laser 1100	—	—	25	35	—	—	45	—	—	—	—	—
Epson Action Laser 1600	—	—	25	30	—	—	45	—	—	90	125	199
Epson Action Laser II	—	—	80	95	105	—	—	135	—	—	—	—
Epson 8000,1800, 4000, 4100, 4300	—	—	80	95	105	—	—	135	—	—	—	—
Epson 1000, 1500, 5000, 5200	—	—	—	85	—	—	175	—	—	—	—	—
HP 2, 2D	—	—	—	85	—	—	130	—	—	—	—	—
HP3, 30, 3P, 2P, 2P+	—	—	45	55	—	—	80	—	—	—	—	—
HP 4, 4M, 4SI, 4SIMX	—	—	30	40	—	—	55	—	—	70	—	—
HP 4P, 4PLUS, 4MPM 1600, 1600CM	—	—	25	30	—	—	35	—	—	55	95	—
HP4L	—	—	30	—	—	—	—	—	—	—	—	—
HP 3SI	—	—	25	30	—	—	35	—	—	55	95	—
HP 5P, 5MP, 4V, 4MV	—	—	25	30	—	—	35	—	—	55	95	—
HP Design Jet 200, 220	—	—	—	40	—	—	50	—	—	85	—	—
HP Design Jet 600, 650	—	—	—	—	—	—	35	—	—	55	95	199
HP Deskjet 500,500C,510,550,560	—	50	—	—	—	—	—	—	—	—	—	—
HP Deskjet 1200C, 1200C-P	—	—	—	35	—	—	45	—	—	85	—	—
HP Paintjet XL300	50	—	—	—	—	—	65	—	—	140	295	—
IBM Laser 4019, 4019E	—	—	70	85	—	110	—	—	—	—	—	—
IBM Laser 4029, 4037	—	—	25	35	—	—	55	—	—	—	—	—
IBM Laser 4039, 4079	—	—	—	30	—	—	35	—	—	55	95	215
Konica LP-3110, 3115	—	—	115	185	235	—	—	—	—	350	—	—
Lexmark Medley 4C, 4X, 4SX	—	—	Call	Call	Call	—	—	—	—	—	—	—
Lexmark Optra L, LX, R, RX	—	—	—	30	—	—	35	—	—	55	95	215
Lexmark Valuwriter 300, 600	—	—	25	35	—	—	55	—	—	—	—	—
Lexmark Valuwriter 200, 400, 600	—	—	25	35	—	—	55	—	—	—	—	—
NEC 90, 290	—	—	—	125	—	—	—	—	—	—	—	—
NEC Silentwriter 95, 95fx, 97, 97fx	—	—	35	55	—	—	—	—	—	—	—	—
Oki 400	—	—	65	80	—	—	—	—	—	—	—	—
Oki 400E, 400EX, 410E, 410EX	—	—	85	100	—	—	135	—	—	—	—	—
Oki 810E, EX, 600E, EX, 610E, EX	—	—	85	100	—	—	135	—	—	—	—	—
Oki 830, 840	—	—	—	85	—	—	—	—	—	—	—	—
Oki 2350, 2450	—	—	Call	Call	—	—	—	—	—	—	—	—
Packard Bell PB 9500	—	—	—	135	—	—	225	—	—	—	—	—
Packard Bell 9815	—	—	—	135	—	—	225	—	—	—	—	—
Panasonic 4420, 4450I	—	—	70	85	—	—	120	—	—	—	—	—
Panasonic 4410, 4430	—	—	70	85	—	—	120	—	—	—	—	—
Panasonic 4450	—	—	60	—	—	—	—	—	—	—	—	—
Panasonic 4400, 5400	—	—	45	50	—	—	65	—	—	—	—	—
Panasonic 4440, 5410, 6500	—	—	65	75	—	—	100	—	—	—	—	—
Sharp 9400, 9460, 9600, 9700E	—	—	65	75	—	—	100	—	—	—	—	—
Sharp 9500, E, H, 9700, H	—	—	85	—	—	—	145	—	—	—	—	—
TI XL PS17-PS35, Micro Writer	—	—	45	65	—	—	—	—	—	—	—	—
TI Microlaser Pro E, Powerpro 600	—	—	45	65	—	—	85	—	—	125	—	—

DELL DESKTOPS & TOWER PC'S

MODEL	MODULE/KITS	PRICE
PowerLine Workstations (all models)	8MB	80
	16MB	145
	32MB	270
PowerEdge SP (all models)	8MB	70
PowerEdge XE Pentium (all models)	16MB	120
OmniPlex 560/ME	32MB	210
OmniPlex 566/ME	64MB	425
OmniPlex 590/ME		
PowerEdge XE 466	4MB	30
PowerEdge XE 450	8MB	45
PowerEdge XE 433	16MB	90
PowerEdge XE 433s	32MB	180
OmniPlex ME Series		
System 433TE	8MB	70
System 425TE	16MB	120
OptiPlex DGX Series (Pentium)	8MB	70
	16MB	120
	32MB	210
	64MB	425
OptiPlex G & GX Series (Pentium)	8MB EDO	60
	16MB EDO	115
	32MB EDO	230
	64MB EDO	420
Low Profile Power Desktop (all)	4MB	30
Power Desktop (all models)	16MB	120
OptiPlex 4100/e	4MB	30
OptiPlex 466/e	16MB	90
OptiPlex 450/e		
OptiPlex 433/3		
OptiPlex V Series (all models)		
Performance T, L, M (all models)		
Dimension & Dimension XPS Series	4MB	25
(Pentium)	8MB	39
* Installed in pairs	16MB	69
	32MB	129
	4MB EDO	20
	8MB EDO	35
	16MB EDO	65
Laptop and Notebook PC's		
Latitude XPi (Pentium)	4MB Module	40
Latitude XP (486)	8MB Module	70
	16MB Module	120
Latitude LX (486)	4MB Module	55
	8MB Module	95
	16MB Module	130
Latitude 433mc 450mc	4MB Module	55
Latitude 450mcx	8MB Module	95
Latitude 433m	16MB Module	130
Latitude 433, 433c, 433cx	4MB Kit	55
	16MB Kit	115

DIGITAL NOTEBOOK PC'S

MODEL	MODULE/KITS	PRICE
HiNote VP (Pentium)	8MB EDO	69
	16MB EDO	125
	32MB EDO	250
HiNote Ultra II (Pentium)	4MB Module	40
	8MB Module	70
HiNote Ultra (all models)	16MB Module	120
	4MB Module	40
	8MB Module	70
	16MB Module	120
HiNote 4860X4/75	4MB Module	40
HiNote 486DX2/50	8MB Module	70
HiNote 486SX/33	16MB Module	120
HiNote VP (Pentium)	8MB EDD	169
P5-120 Family PC		
P5-133 Family PC		

HEWLETT PACKARD DESKTOP & TOWER PC'S

MODEL	MODULE/KITS	PRICE
Pavilion Series (Pentium)	4MB Module	30
* Installed in pairs	8MB Module	55
	16MB Module	95
	32MB Module	185
NetServer LF (all models)	4MB Module	40
NetServer LM (all models)	8MB Module	65
NetServer LM2 (all models)	16MB Module	110
NetServer Lc Series (all models)	32MB Module	200
Vectra XP/60		
Vectra VL2 Pentium (all models)		
NetServer LE Series 486DX/33	4MB Module	40
NetServer LE Series 486SX/33	8MB Module	85
NetServer LE Series 486DX/66	16MB Module	110
NetServer 4/33 LM	32MB Module	200
Vectra VE/4 & XM3 Series	4MB Module	30
* Installed in pairs(XM3 Series)	8MB Module	50
	16MB Module	90
	32MB Module	175
Vectra VE/5,VL4 & XM4 Series	4MB EDO Module	20
* Installed in pairs	8MB EDO Module	35
	16MB EDO Module	65
	32MB EDO Module	125
Vectra XU 5/100	4MB Module	30
Vectra XU 5/90C (GX)	8MB Module	55
Vectra XU 5/90	16MB Module	95
Vectra XM3	32MB Module	185
Vectra VL3		
Vectra M2 (all models)	4MB Module	30
Vectra N2 (all models)	8MB Module	55
Vectra XM2 (all models)	16MB Module	95
Vectra VL2 486 (all models)	32MB Module	185
Vectra EM Series (all models)	4MB Module	35
Vectra ST (all models)	8MB Module	85
	16MB Module	120
Vectra PC (all models)	8MB Module	65
	512MB VRAM Kit	45
Vectra 486 PC	4MB Module	35
	8MB Module	65
Vectra 486/33T	4MB Module	35
Vectra 486/25T	8MB Module	65
	512MB VRAM Kit	40
Vectra N (all models)	4MB Module	35
Vectra M (all models)	8MB Module	65
Vectra NI (all models)	16MB Module	120
Models to be upgraded	Module/KitsPrice $	
Vectra 486/66VL	4MB Module	35
Vectra 486/33VL	8MB Module	85
Vectra 486/25VL	16MB Module	120

NEC DESKTOPS & TOWER PC'S

MODEL	MODULE/KITS	PRICE
Image Pentium (all models)	4MB Module	25
Image 4100m,4100es	8MB Module	39
Image 466ex,450es;433es	16MB Module	69
PowerMate Express/II (all models)	32MB Module	129
PowerMate Express 486/66Te	4MB Module	40
PowerMate Express 486/50Te	16MB Module	110
PowerMate Express 486/50Te		
PowerMate Express 486SX/25Te		
PowerMate Express 486/33e; 66e		
PowerMate V Series (486 & Pentium)	4MB Module	40
* Installed in pairs on Pentium systems	8MB Module	65
	16MB Module	110
	32MB Module	220
Power Mate Express 486/50e	4MB Module	40
Power Mate Express 486SX/25e	16MB Module	110
Power Mate Express 486SX/20e		
Image 466, 433, 425		
PowerMate 477es, 433es,425es		
Ready 466es, 433es,425es,		
PowerMate P60M	4MB Module	40
Ready P60M	8MB Module	65
PowerMate 4100M, 466M, 4660	16MB Module	110
PowerMate 466M	32MB Module	220
Ready 4100M, 466m; 4660, 4330		
PowerMate P60D		
PowerMate 466, 433, 425	4MB Module	40
Ready 433, 425	16MB Module	140

NEC NOTEBOOK PC'S

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UltraLite SL/20P		
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'P5-133, P5-120, P5-75	8MB Module EDO	35
P5-75 Family PC P5-100 Family PC	16MB Module EDO	65
P5-120 Family PC	32MB Module EDO	125

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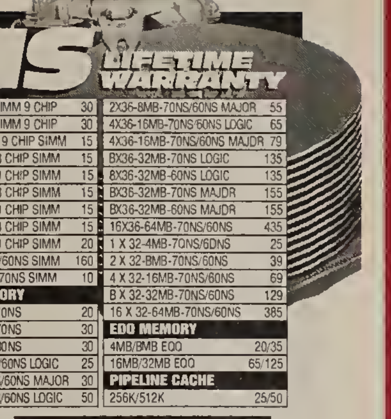

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4MB X B-70NS SIMM	30
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1MB X 9-70NS SIPP	25
1MB X 9-60NS SIPP	25
256K X 9-70NS SIPP	15
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4MB X9-60NS SIMM 3 CHIP LOGIC	25
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4MB X 9-80NS SIMM 9 CHIP	30
4MB X 9-70NS SIMM 9 CHIP	30
4MB X 9-60NS SIMM 9 CHIP	30
1MB X 9-100NS 9 CHIP SIMM	15
1MB X 9-80NS 3 CHIP SIMM	15
1MB X 9-80NS 9 CHIP SIMM	15
1MB X 9-70NS 3 CHIP SIMM	15
1MB X 9-70NS 9 CHIP SIMM	15
1MB X 9-60NS 3 CHIP SIMM	15
1MB X 9-60NS 9 CHIP SIMM	20
16MB X 9-70NS/60NS SIMM	160
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8X36-32MB-60NS LOGIC	135
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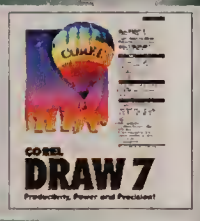

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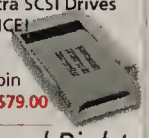

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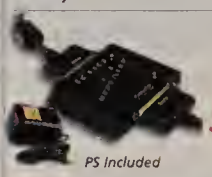

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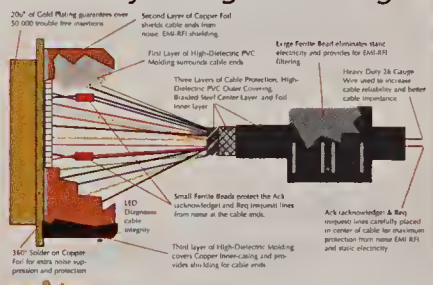

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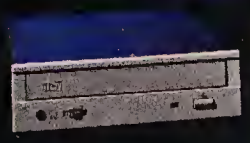

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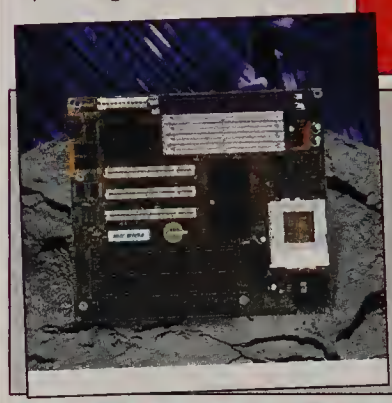

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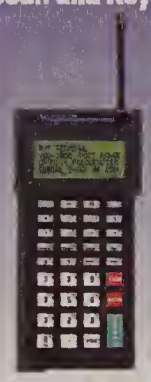

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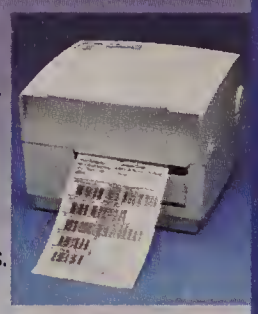

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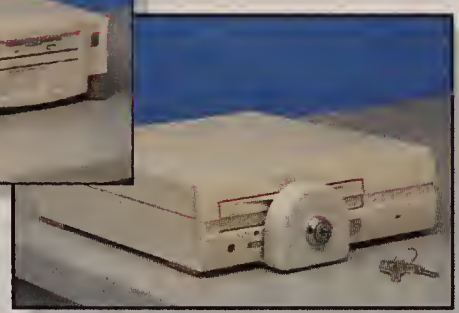

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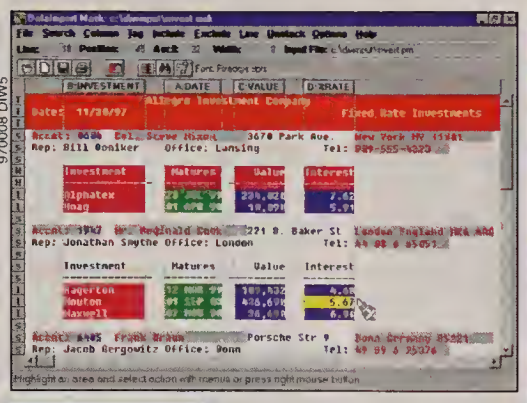

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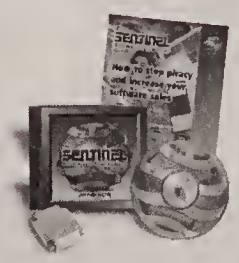

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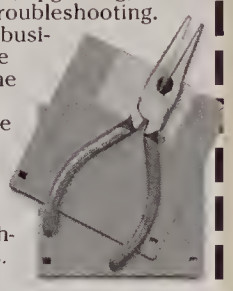

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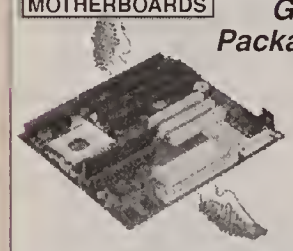

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	4	8	16	32
AST	49	—	119	219
Canon	49	69	119	219
Compaq	49	69	119	219
Dell	49	69	119	—
Epson	49	69	119	—
Fujitsu	—	69	119	199
Gateway	49	69	119	229
IBM	49	69	119	229
NEC	49	69	119	219
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954 Monitors and video boards
955 Accounting software
956 Graphics software
957 Network/sharing products
958 Printers
959 Multimedia products
960 Utilities
961 Mail order companies
962 Storage devices

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PC MAGAZINE JULY 1997

SERVICE AND RELIABILITY SURVEY

When it comes to service and reliability, who's the one notebook vendor you can truly count on? According to the nearly 8,500 people who responded to *PC Magazine*'s 10th Annual Service and Reliability Survey, there is only one. (Impressive considering they rated some 3,800 notebooks from 15 vendors, isn't it?) How did we earn the only "A"? Over the last year, our users reported better than average scores on four key measures: satisfaction with reliability, repair experience, and technical support; and the need for recent repairs. They also said they'd buy one again. To say the same for your notebook, visit us on the Web or give us a call.

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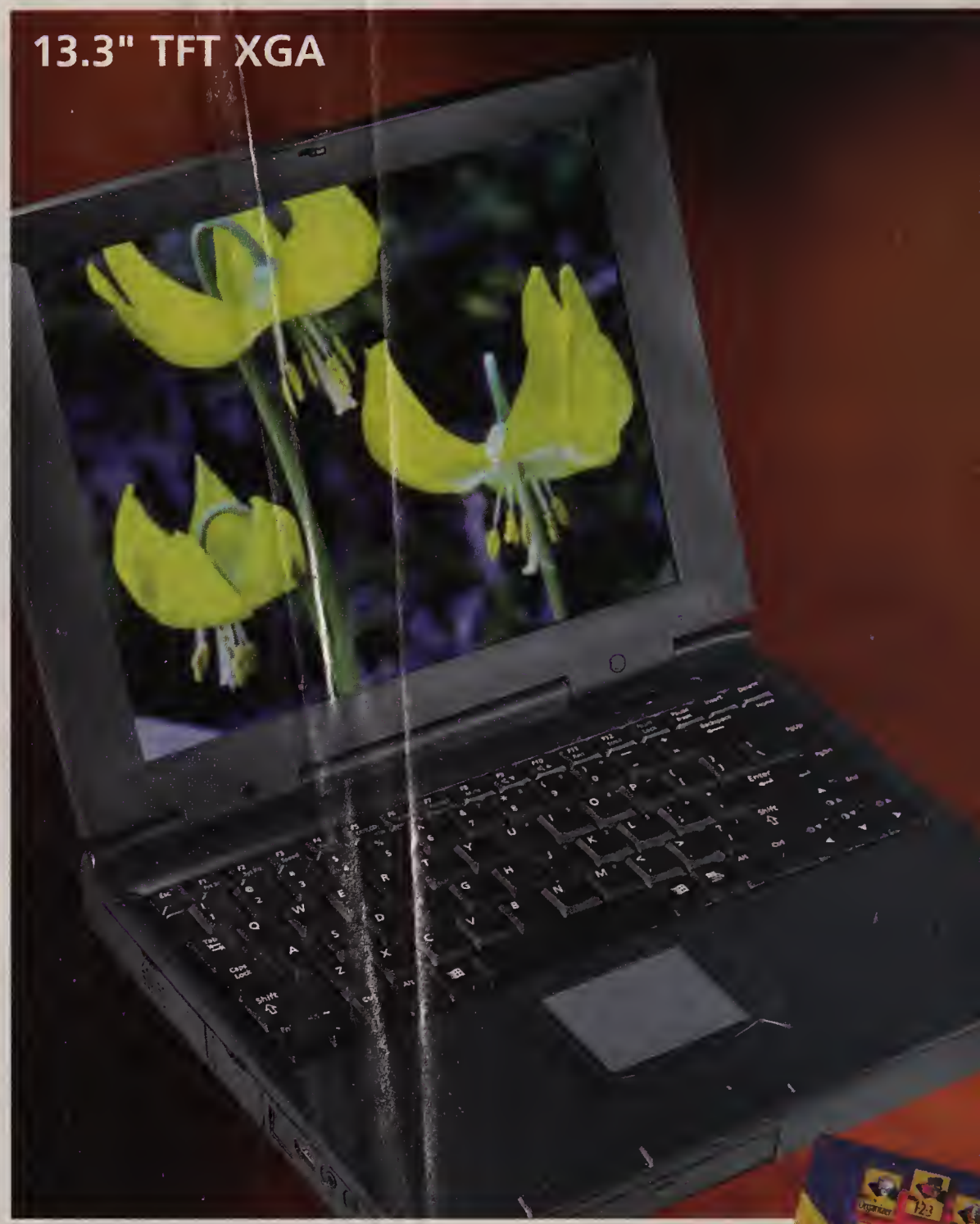

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The Right Time to Buy? Almost.

IN THIS BUSINESS, the product you want is always just around the corner and everyone lives in a perpetual state of almostness. Just the other day I was chatting with a guy who said he really needed to upgrade his home machine but wouldn't think of doing it until Windows 98 came out. He didn't want to buy a current model with advanced hardware, like the Accelerated Graphics Port, that would be unsupported by the old operating system. He was willing to wait for features like OnNow, which promises to eliminate boot-time delays. And he certainly didn't want to go through the pain of upgrading his new machine's OS.

Who was this guy? A Microsoft executive.

READY? NOT

THE MOTTO OF THE PC business might well be, "We will sell every product before its time." The industry is full of *almosters*—products that do most or all of what they promise, yet somehow miss the mark with one fatal flaw or a bunch of little ones. They increasingly turn up from companies offering products I like, respect, and even have bought. The worst companies don't get in the ball game; the best ones increasingly take shortcuts that make their products more suitable for the bench than the playing field.

The motto of the PC business might well be, "We will sell every product before its time."

Nowhere is this nasty trend clearer than in the hardware business, where product cycles are going nuts. By the time you get comfortable with your new machine, the one with the goodies you *really* wanted is on the store shelves.

Lately, unless you need top-of-the-line power (and most of us don't), lower-end PCs look more and more attractive. Trouble is, these cheap machines always manage to lack one element you really need—like the cache, expansion slots, or decent graphics. This M.O. may change as low-end competition heats up, but as I write, a surprising number of these PCs are near-miss almosters.

It's not just computers that make you want to wait for the next iteration or the one after that. Take Hewlett-Packard's PhotoSmart scanner. It can handle small photos, but its real gift is scanning negatives and slides. At $500, it produces the best photographic output I've seen from a reasonably priced unit. There are just two problems: The software can do annoying things like put subtle but unwanted light and dark bands in the images, and the scanner's ISA SCSI card makes installation an absolute nightmare. Would I buy one? Almost.

HP's OfficeJet 600 is another idea that's not quite there. This all-in-one unit is a copier, fax machine, color printer, and scanner, but neither the printer nor the scanner lives up to HP's tradition of quality. The truly boneheaded design provides a single output tray for what you feed in and what you print, making it possible for originals to land on copies that are still wet with ink. I love the idea of a does-it-all machine, but this unit is the very definition of almostness.

O PIONEERS!

AGAIN AND AGAIN, pioneers get hosed. Did you spring for one of the first generation of CD-RW drives? They use rewritable media, but it turns out they work rather differently from competitive products like hard drives. If you want to erase files and actually recover that disc space, you have to reformat and erase everything. That snafu is being fixed in the second generation, but the rewritable discs will still play only in CD-RW drives or so-called multiread CD-ROM drives, which limits them to some very recent models. At least the CD-RW drives can create universally readable CD-R discs.

Did I say universally? Oops: almost. CD-R discs won't play on the first generation of DVD-ROM drives. Considering that more flexible second-generation DVD-ROM models should be available by the time you read this, it's clear the first generation should never have seen the light of day. And maybe you don't want one of the current DVD models, either, since they seem unlikely to be able to read rewritable DVD-RAM discs when they do arrive.

My credit card is warm and ready. There's stuff out there I genuinely need. But is now the time to buy when I know that better things are just around the corner?

Almost.

PC World *contributing editor Stephen Manes is a columnist for the* New York Times *and half of* The Digital Duo, *which will premiere in November on select Public Broadcasting stations.* ■

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300MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:
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- *NEW* 1200HS Monitor (17.9" v.i.s., .26dp)
- *NEW* Matrox Millennium II 8MB WRAM AGP Video Card`
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-490 Full Dolby Surround Sound Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive with Dne Cartridge

$3599
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- *NEW* STB Velocity 4M8 AGP Video Card
- *NEW* Creative Labs AWE64 Value Sound Card
- Altec Lansing ACS-490 Full Dolby Surround Sound Speakers with Subwoofer

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Personal Lease: $134/Mo., 24 Mos.
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233MHz PENTIUM II PROCESSOR FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 32MB SDRAM Memory
- *NEW* 6.4GB Ultra ATA Hard Drive (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB Velocity 4MB AGP Video Card
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-290 Speakers with Subwoofer

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★ *Upgrade to a Creative Labs AWE64 Value Sound Card, add $39.*

$2499
Personal Lease: $111/Mo., 24 Mos.
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200MHz PENTIUM PROCESSOR **WITH MMX TECHNOLOGY**

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- Matrox Millennium II 4MB WRAM PCI Video Card
- Sound Blaster 16 WaveSynth Wavetable Sound
- Altec Lansing ACS-290 Speakers with Subwoofer

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★ *Upgrade to a Matrox Millennium 8MB WRAM PCI Video Card, add $79.*

$1999
Personal Lease: $89/Mo., 24 Mos.
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- 32MB SDRAM (144MB Max)
- 512KB L2 Pipeline Burst Cache
- 128-bit Graphics Accelerator with 64K Colors at 1024x768
- 2.1GB ATA Hard Drive
- Zoom Video and US8 Ports
- Stereo Speakers with 3D Surround Sound and Yamaha SW Wavetable
- Cardbus ready/Fast IR1.1
- 6.9 Pounds*

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$3999‡
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Common features listed above plus:
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- 32MB SDRAM (144MB Max)
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- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- 2.1GB ATA Hard Drive
- Zoom Video and US8 Ports
- Stereo Speakers with 3D Surround Sound and Yamaha SW Wavetable
- Cardbus ready/Fast IR1.1
- 6.4 Pounds*

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$3399‡
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- 16MB SDRAM (144M8 Max)
- 256KB L2 Pipeline Burst Cache
- 128-bit Graphics Accelerator with 16 Million Colors at B00x600
- 2.1GB ATA Hard Drive
- Zoom Video and USB Ports
- Stereo Speakers with 3D Surround Sound and Yamaha SW Wavetable
- Cardbus ready/Fast IR1.1
- 6.4 Pounds*

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- IrDA 1.0 Std. Compliant
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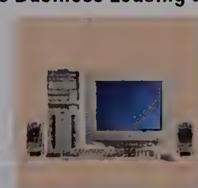

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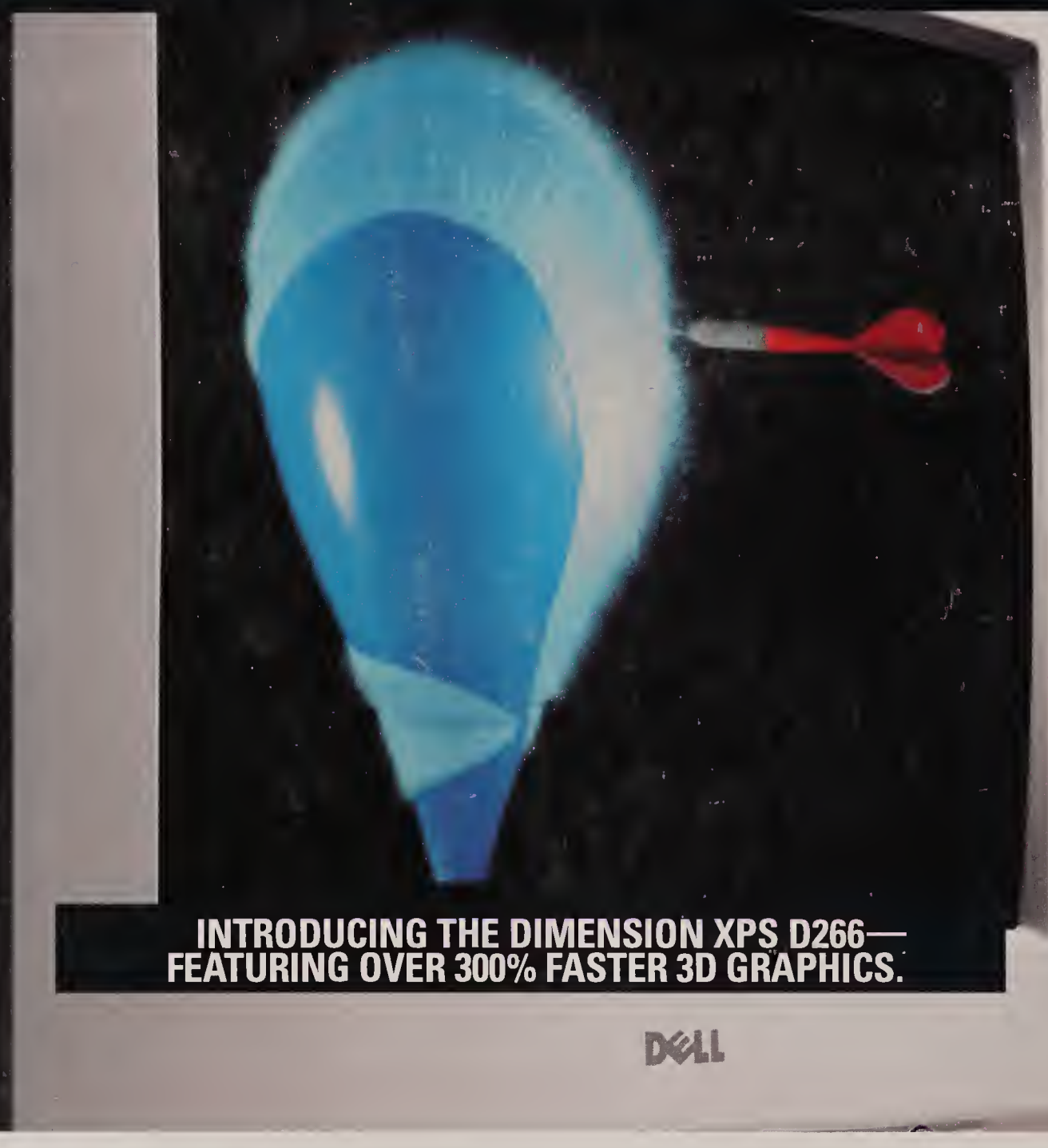

***NEW* DELL DIMENSION® XPS D266**
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- ★ **32MB SDRAM Memory**
- 512KB Integrated L2 Cache
- ★ ***NEW* 6.4GB Ultra ATA Hard Drive (9.5ms)**
- 1000LS Monitor (15.9" v.i.s.)
- ★ ***NEW* STB Velocity 4MB AGP Video Card**
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